AMERICAN FRUIT GROWER

FEBRUARY 1931

THE SPRAY RESIDUE PROBLEM
SOME ELEMENTS OF STATIONARY SPRAYING
FINDS WAY TO CONTROL NEW CHERRY PEST
THE PERENNIAL PROBLEM OF THE WORMY PEACH
EXPERIMENT STATIONS SOLVE FRUIT GROWERS' PROBLEMS
HIGH DILUTION SPRAYS PRODUCE CLEAN FRUIT
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SPRING FASHIONS—PAGE 34

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AMERICAN FRUIT GROWER

VOLUME 51 | FEBRUARY, 1931 | NUMBER 2

A FUTILE RECOMMENDATION

IF THE READER will take the time necessary to read thoroughly the entire report of the Wickersham Commission, the violent inconsistencies of its Recommendations and Conclusions, when compared with the separate conclusions of its members and with the body of the Report itself, become startlingly apparent.

With the Report in general, or with the general conclusions reached by the Commission and by its several members there will be agreement or disagreement according to the views previously entertained by individuals. But the specific recommendation regarding what the Commission is pleased to term "the anomalous position of cider and fruit juices" under the National Prohibition Act calls for some comparison of this recommendation with certain findings in the body of the Report.

Under the head of "Conclusions and Recommendations" the Commission makes some proposals for legislation "to give to enforcement the greatest practical efficiency," among which is the following:

"2. Removal of the anomalous provisions in Section 29, National Prohibition Act, as to cider and fruit juices by making some uniform provision for a fixed alcoholic content."

Evidently, it is the purpose of the Commission to place home-made wines on the same legal, or illegal, basis as that now occupied by home-made malted and spirituous liquors, beer and whiskey.

Surely, if under the present status of the Act fair control has been obtained over the home brewing of beer and the home distilling of spirits, and if in contrast, the home making of cider, wines and other fermentable fruit juices presents a more formidable problem, then such recommendation for amendment to the Prohibition Act might have at least plausible foundation.

In the body of the Report, under the head of "The Present Condition as to Observance and Enforcement," and under the subheading "Production in Homes," the home making of beer, spirits and wine is given attention in a manner that permits of drawing some comparisons. Cider is not mentioned.

Of the home brewing of beer the report bears witness:

"At one time there was an increasing amount of home brewing of beer among the average city dwellers, made possible by the production and sale of malt syrup. The beer had a high alcoholic content. . . . Today there seems to be less of this than formerly because of the inconvenience, the poor quality of the product and *the low cost of procuring whiskey.* But the recent increased demand for beer in some sections has led to the development of home brewing by people of lesser means, not solely for home use but also for sale."

Of the home manufacture of spirituous or distilled liquors the report says:

"Home distilling has gone on from the inception of prohibition and in some localities has at one time or another reached large proportions. Few things are more easily made than alcohol. A home-made apparatus will suffice, and with the variety of materials available and the ease of procuring those materials anyone may carry on home distilling on a small scale. The product is of poor quality but it is cheap. The line between distilling in the home for home use, distilling for neighbors, distilling in part for neighbors and in part for sale, and distilling for bootleggers is not definite and is easily overpassed. Also the fact that much home production of liquor goes on everywhere facilitates use of what appear to be dwellings as cloaks for illicit manufacture."

That the limitation of fermented and spirituous liquors under Section 1 of the Act to one-half of one per cent alcoholic content has not interfered seriously with their wide distribution and availability may be gathered from the following, quoted from under subhead "Evidence of Prices":

". . . Whiskey of good quality is obtainable substantially everywhere at prices not extravagant for persons of means. It is true many cannot afford these prices and for them a large amount of cheap, poor-grade, or even poisonous, liquor is constantly produced and is in general circulation."

This being the situation in regard to malted and spirituous liquors, the home manufacture of which is now forbidden by Section 1 of the Prohibition Act, what is the Commission's picture of the status of the home wine industry? The Report, after stating at length the "anomalous" position of fruit juices under Section 29, goes on to say:

"As the matter stands, then, when wine is produced in the home for home use, whether or not the product is intoxicating is a question of fact to be decided by the jury in each case. If this view stands, it becomes impracticable to interfere with home wine making, and it appears to be the policy of the Government not to interfere with it. Indeed the Government has gone further. Prepared materials for the purpose of easy home wine making are now manufactured on a large scale with Federal aid. Much of the home made wine gets into circulation. The possibilities of leakage, when there is pressure on other sources of supply, are always considerable."

Taking the statements of the report at face value one is left in a mental haze as to just what the Commission believes can be accomplished along the line of tighter enforcement by removing fruit juices from the exemptions afforded under Section 29. The Commission finds the home production of beer and of whiskey to be general, so very general indeed that it virtually recommends against any attempt at Federal interference with the practice, as we read further:

"The difficulties presented by home production differ from those arising in other phases of the general situation in that they involve the arousing of sentiment through invasion of the home and interference with home life. *Necessity seems to compel the virtual abandonment of efforts for effective enforcement at this point* . . . Law here bows to actualities." (Italics ours.)

This being the case we are somewhat at loss to understand just what results, if any, are to be expected from the recommended revision of Section 29.

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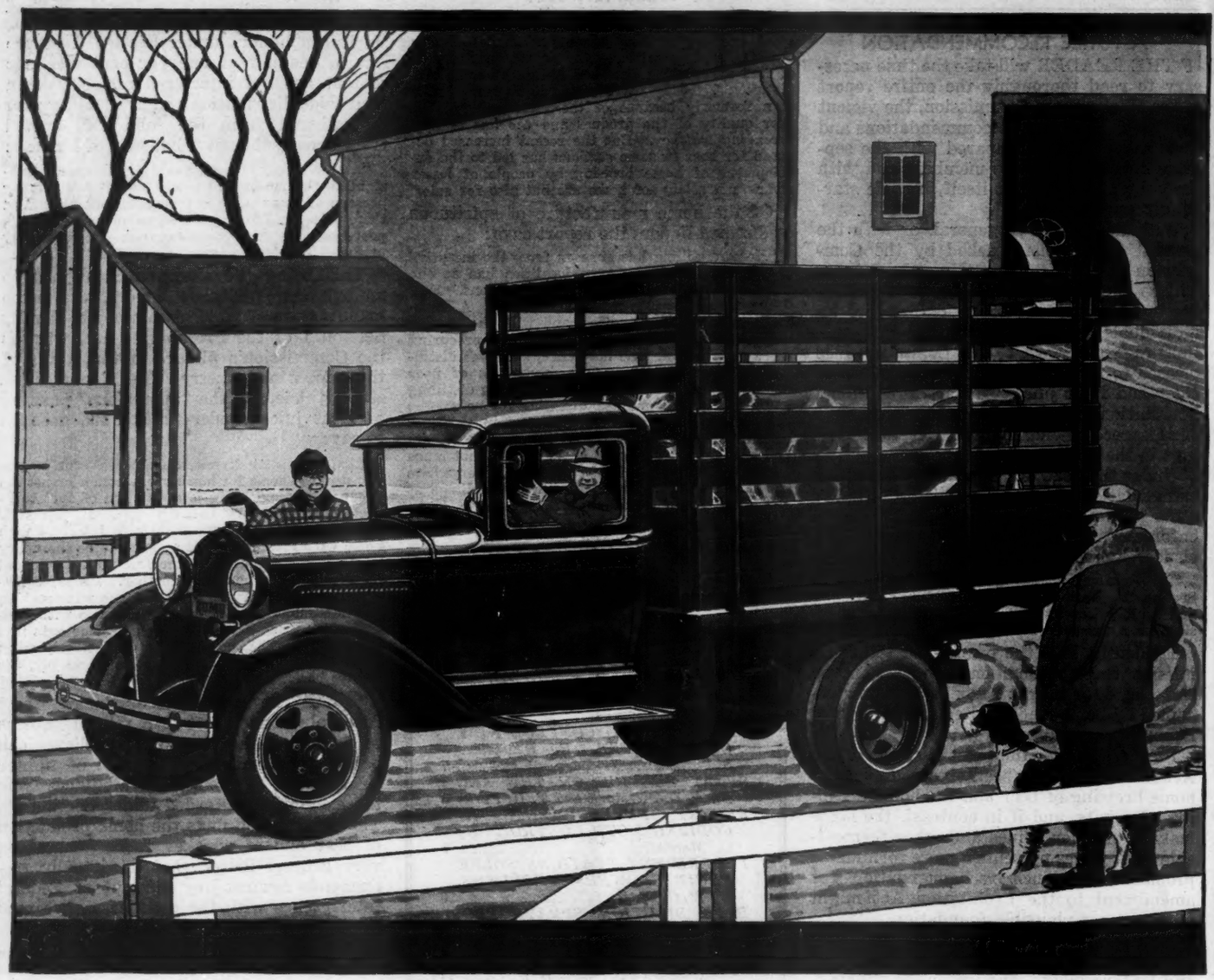
WHAT HAVE YOU TO HAUL?

Put it up to the Ford Truck



IN THE business of farming, Ford trucks have found an important place. Daily, throughout the year, and in every locality, these trucks are helping to lighten many hauling-tasks. For short runs, with light loads, or heavy-laden on long hauls, they bring speed, power, and endurance to the work. And their economy becomes more evident with each mile they travel and every day they serve.

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NEW LIGHT ON THE SPRAY RESIDUE PROBLEM

By T. J. TALBERT and W. L. TAYLOE

AS A MEANS of stimulating systematic experimental work to determine carefully the effects of insecticidal sprays upon animal life, a preliminary study using albino rats was begun by the Department of Horticulture, University of Missouri, in the fall of 1930. The spraying chemicals employed and fed to the rats were arsenate of lead, barium fluosilicate, and cryolite.

It should be understood, however, that this report gives results of preliminary investigations on a comparatively small number of tests and that the ultimate results may be sharply modified by the final report. The findings are sufficient, it is believed, to indicate to some degree the margin of safety with which human beings may eat apples which have been sprayed with arsenate of lead.

Experimental Animals

The rats were divided into three series. The first group in series I was fed lead arsenate, the second group cryolite, and the third group barium fluosilicate. The amounts fed were comparable to or greater than the quantities of arsenous oxid which may be found on unwashed sprayed fruit. Different lots of rats designated as series II and III were fed increasing amounts of arsenate of lead in order to determine the lethal amounts of the poison for the rats. The amounts of insecticides fed were based upon the international tolerance of 0.01 grain of arsenic per pound of fruit. In all 36 rats were employed in this preliminary investigation.

The rats used in series I and II were 28 days old, while three of those used in series III were 70 days old and five were 31 days old at the time the feeding experiment was begun. Series I was fed insecticides for 12 weeks, series II for eight weeks, and series III for two weeks. The insecticides were given to series I and II at about 4:00 p. m. daily, and series III at 8:00 a. m. daily.

Each rat was caged separately in a nine-inch round cage. For both food and water one-half pint glass jars were employed as containers. A balanced ration consisting of whole wheat flour, dried whole milk, and salt was kept in jars before the rats at all times. Distilled water was used exclusively as drinking water at all times for the rats. All containers were cleaned and sterilized twice each week and the cages were cleaned three times each week.

A general view of the laboratory and equipment where the tests were conducted. The cages were cleaned three times a week. Analysis of the excretions showed complete elimination of the arsenic fed to each rat.

Dosages Used on Rats Under Tests

Series No.	Age of Rats	No. of Rats	Dosage	Feeding Period
I	28 days	6	1 x International Tolerance	12 weeks
I	28 "	6	2 x " "	12 "
I	28 "	6	3 x " "	12 "
II	28 "	2	2 x " "	8 "
II	28 "	2	6 x " "	8 "
II	28 "	2	12 x " "	8 "
II	28 "	2	18 x " "	8 "
II	28 "	2	24 x " "	8 "
III	31 "	1	1.857 mg. per kilogram	2 "
III	31 "	1	2.785 " " "	2 "
III	31 "	1	5.671 " " "	2 "
III	31 "	1	8.456 " " "	2 "
III	31 "	1	22.284 " " "	2 "

Lethal Dosages

Series No.	Age of Rats	No. of Rats	Dosage	Feeding Period
III	10 weeks	1	487.5 x International Tolerance	30 hours
III	10 "	1*	44.568 x " "	192 "
III	10 "	1**	185.713 x " "	60 "

*Received nineteen doses. **Received three doses.

Materials and Methods

As a basis for establishing dosages, the international tolerance of 0.01 grain of arsenic per pound of fruit was used. Moreover, the dosage was based on relative body weight, using 70 kilograms as the weight of a human. The rats in the first series received one, two, and three times the international tolerance.

The chemical analysis of the manufacturer states that 30 per cent of the product consists of arsenous oxid. This figure was used in making the determinations. The same weight of barium fluosilicate and cryolite was employed in the investigations.

For the first three weeks in series I all the insecticides were given dry in a small amount in the regular diet of the rats. After this three-week period, however, a change was made to a liquid dose given by mouth, as this appeared to be a more careful and effective method of feeding. It was also believed that mouth feeding eliminated the danger of individual rats failing to receive the entire amount of the insecticide. Six doses were given per week, as shown in the table on this page.

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THE PERENNIAL PROBLEM OF THE WORMY PEACH

By WILLIAM STARR

FOR most of us who have been in the peach game for any length of time, there is no condition—with the possible exception of crop failure from adverse weather conditions, and the other extreme: general overproduction—which presents more serious difficulties aud causes more financial loss than that of the wormy peach. It is constantly with us, whether the crop is light or heavy.

Worm Infestation and the Grower

In a season such as the one just past, with short crops reported in most peach sections east of the Rocky Mountains, due to severe winter kill and late frost damage, the matter of worm infestation assumes an even more important aspect than in years of normal production. There are three essential considerations involved here: (1) with a short crop of fruit and a normal emergence of worm-producing insects, the outlook would be for a relatively high percentage of wormy peaches, unless rigid control measures are adopted. (2) With the prospects of a light crop and the consequent higher prices, it will be considerably to the grower's advantage to market clean, sound fruit. (3) If orchards with considerable crop failure are neglected because the owners feel that control measures are not justified by immediate financial results, and the insect pests allowed to gain a foothold and multiply unchecked, the next year's emergence is likely to be a greater one. On the other hand, there is always the possibility that winter cold, severe enough to injure the peach crop, will decimate the overwintering insect pests.

The Plum Curculio

There are two sources of the wormy peach. By far the most common and destructive of these is the curculio or plum weevil. The insect is destructive to the peach in both larval and adult stages. The first appearance of the adult beetles in the spring depends upon the mildness of the weather. Normally, they will be found feeding upon the fruit blossoms and leaves at the time of the petal fall. At this stage, the first spray or dust application should be made. It is generally conceded that a thorough spray is a little more effective than a dust application.

For control of the curculio alone, one pound of finely powdered arsenate of lead, with milk of lime (made from three to four pounds of unslacked stone lime—used to lessen arsenical injury and also serve as a spray marker) added to 50 gallons of water, should be used as a spray. However, it is better, and the more common practice, in the first summer spray, to use self-boiled lime-sulphur 8-8-50, or reliable commercial dry-mix preparations in amounts recommended by the manufacturers, as a substitute for the

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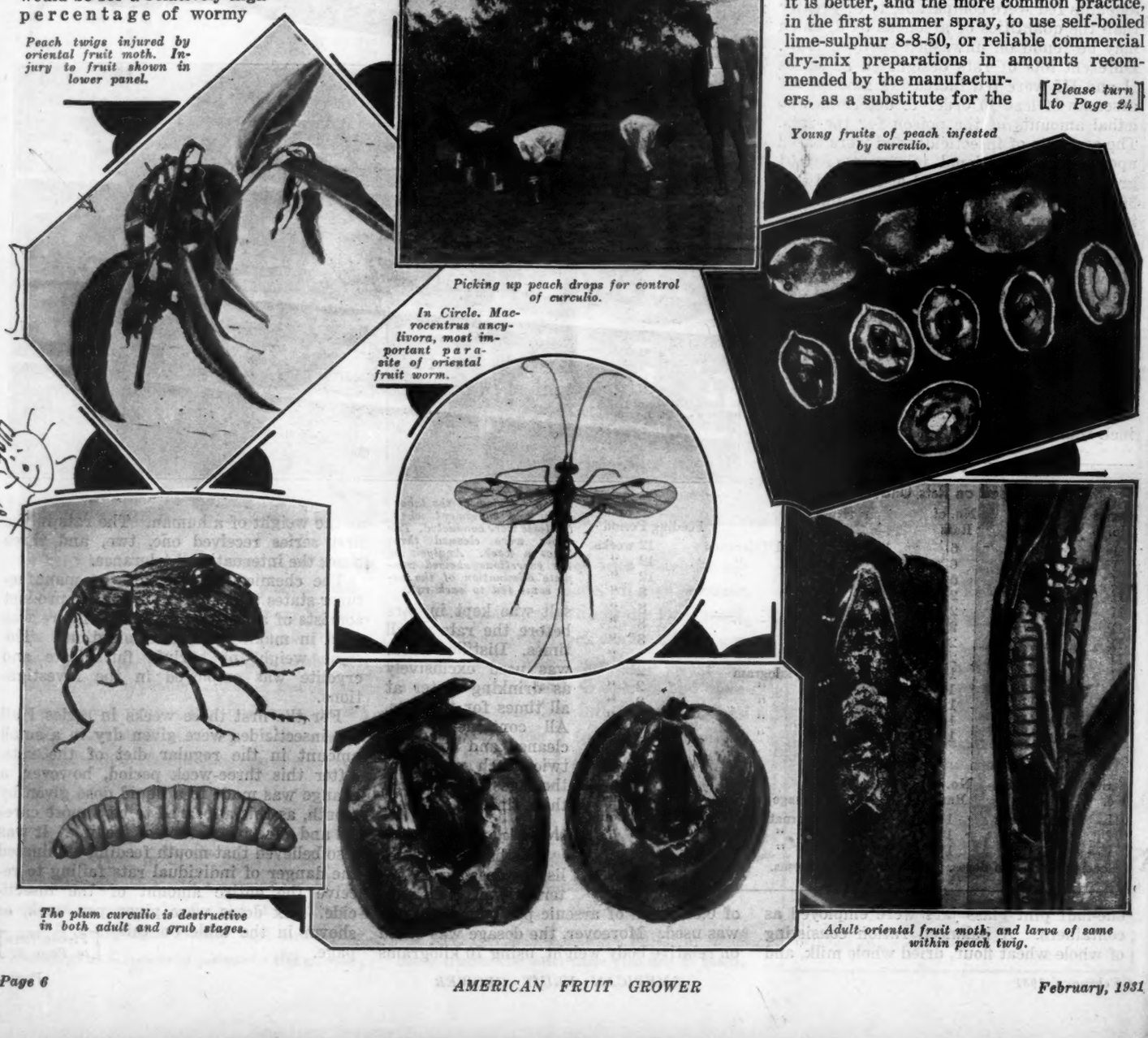

Peach twigs injured by oriental fruit moth. Injury to fruit shown in lower panel.

Picking up peach drops for control of curculio.

Young fruits of peach infested by curculio.

In Circle. Macrocentrus ancylivora, most important parasite of oriental fruit worm.

The plum curculio is destructive in both adult and grub stages.

Adult oriental fruit moth, and larva of same within peach twig.

FINDS WAY TO CONTROL NEW CHERRY PEST

By RENSSELAER SILL

CHANGING its food from the common wild cherry to the more appetizing cultivated varieties, a little known insect, called the cherry case bearer, has within a few years become of considerable economic importance and has threatened to wipe out thousands of orchards in Door county, Wisconsin. Five thousand of the 12,000 acres in orchards in this region were infested with the new fruit pest and many growers have already suffered severe losses.

Because of its peculiar habit of living in a protective case or wall that it carries about with it, and because it obtains its food by tunneling inside the leaf between the upper and lower surfaces, the pest was exceedingly difficult to combat and for a time its control looked like a hopeless task. But in hopes of finding a vulnerable period in its life cycle which would make possible the development of effective control measures, Dr. A. A. Granovsky, entomologist of the University of Wisconsin, started his study of the insect.

Feeding Habit

During July and August the moths, which are gray, tiny, and have beautifully fringed wings, start laying their eggs promiscuously on the under sides of the leaves a few hours after emerging from the pupal cases. In about two weeks the eggs hatch. The larvae begin feeding on the interiors of the leaves and soon start building their first cases. They do this by cutting and pulling both sides of the leaf about themselves from the inside. The edges of the two leaf surfaces are fastened together, the rear end of the cases cut open, and the case bearers travel to other parts of the leaves for more food. The injury produced by the young larvae in making their first protective cases suggests that of the "shot-hole" disease.

After the insect finds another feeding place, it fastens its case securely to the surface of the leaf and again tunnels between the lower and upper surfaces. Soon, it makes an addition to its first case and then moves about in search of more food. In the course of a single season as many as five cases may be built by the pest.

Along in the fall, the cherry case bearers, well protected by their five cases, fasten themselves tenaciously to the base of the buds, where they over-winter. In the spring, just as the first bits of green are about to appear, they attack the tips of the buds. The tender, fresh green shoots make delicious morsels for the pest and they soon cut the young leaves to pieces. The blossoms are then devoured, including the pistils and petals.

Later in the summer the leaves and even the fruit are eaten by this ravenous little creature. The tattered fragments of the leaves turn brown and the trees appear at a distance to

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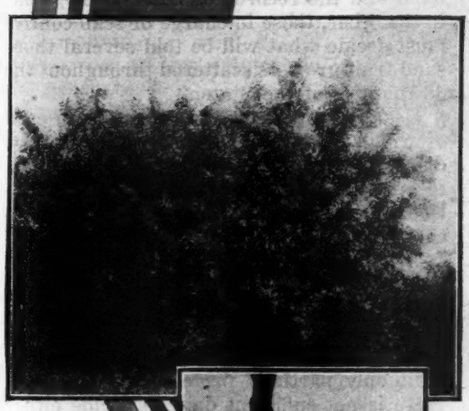
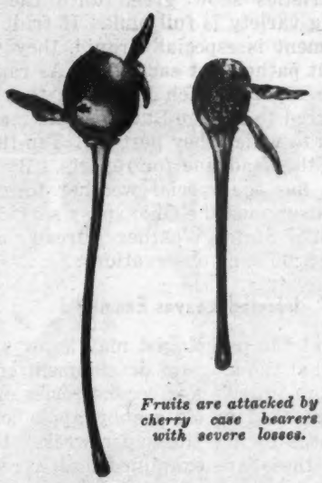
Unsprayed trees were severely injured by the pest which for the first time has become of considerable economic importance.

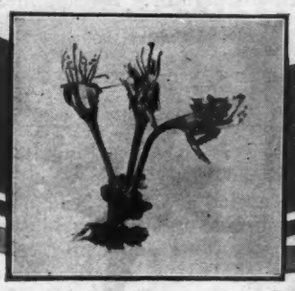




Fruits are attacked by cherry case bearers with severe losses.

The newly developed spray proved to be from 80 to 90 per cent effective in combating the ravages of the pest.

During the winter, cherry case bearers hibernate in their protective cases at the base of the buds.



Here the insects are shown busily at work in their cases devouring the blossoms.

After the pest has fed on the leaves, their tattered fragments turn brown and the vigor of the tree is seriously injured.

In the early spring the case bearers move to the buds and destroy the tender young leaves.

SPRAY SERVICE ON THE AIR

By A. L. PIERSTORFF and T. H. PARKS

"WE NOW present another spray talk of the Ohio Spray Service prepared by Ohio State University and given by Mr. R. W. Dean—Mr. Dean."

Such an announcement would greet the listener's ears were he to tune in his radio on WLW Cincinnati, or WTAM Cleveland at 11:50 a. m. or 12:15 p. m. on Monday, Wednesday or Friday during April, May and June. Just what information would a fruit grower receive and how well would this be adapted to his needs?

Apple Scab Control Recommendations Given Over Radio

At that time of the year the fruit grower is interested in knowing when he should spray his orchard and what materials he should use to control apple scab.

Before the men in charge of the spray service can advise any grower whether or not he should spray for scab control, certain facts must be at their disposal. First, the stage of fruit bud development must be known; second, the percentage of mature apple scab spores in the old leaves on the ground; third, the probable weather for the next two or three days.

In the first place, in any State the size of Ohio there will be considerable variation in fruit bud development. This must be compensated for in making spray recommendations. To overcome this variation, the State has been divided into 17 broadcasting areas and each area given a name to facilitate broadcasting (Figure I). Each fruit grower who is on the county agents' mailing list will receive a map, as shown in Figure I, together with announcements of the broadcasting time.

Sectional Conditions Reported by Telegraph

In each of these sections, several fruit growers or county agents send to the plant pathologist's office a telegraphic report on (1) fruit bud development, which report includes development of three predetermined varieties—an early blooming one like Duchess, a mid-blooming variety like Baldwin, and a late blooming variety like Rome Beauty or Northern Spy; (2) the number of hours of continued rainfall since the last report; (3) progress made in the community on spraying. If the section is hilly, one hill orchard and one valley orchard are included, or if the county agent is sending in the reports he mentions both types of orchards. In order that the same terminology will be used by all co-operators for the same

Figure 1. The State has been divided into 17 broadcasting areas and each area given a name to facilitate broadcasting. Each grower will receive a map like the one shown, together with the broadcasting time.

stage of fruit bud development, a colored chart, plainly labeled, containing eight stages of blossom bud development from silver bud to full pink is supplied each co-operator.

The telegraphic reports are sent as night letters, or day letters if the telegraphic office is not open in the evening or on Sunday. Each co-operator is asked to send in such a report on Sunday, Tuesday and Thursday evenings, from the time the earliest varieties show green until the last blooming variety is full pink. If fruit bud development is especially rapid, they wire the plant pathologist each day. As rapidly as these reports reach his office, they are transferred to a large State outline map in the area to which they pertain. Ten-thirty a. m. is the dead line for reports. By this time he has the special weather forecast, which is supplied the Ohio spray service by the United States Weather Bureau, based on their 8:00 a. m. observations.

Infected Leaves Examined

So that the pathologist may know at all times what the stage of development of the apple scab fungus is, a second series of co-operators send in old scabby apple leaves from three to five times per week. Upon receipt, these are examined and a record kept for each co-operator. By this means it is known at all times what the menace from apple scab infection is in every section, should there come a prolonged rain period suitable for germinating scab spores on unprotected apple leaves. If scab spores are extremely numerous, as was the case in 1929 and 1930, a continuous watch must be kept on the weather and fruit bud development and sprays must be accurately timed if control of scab is to be secured with a minimum number of applications.

When the pink spray is applied, growers cease sending in leaves until seven days after petal fall, when they send three samples on three successive days. By examining these leaves the pathologist has an indication of the potential menace of apple scab originating as primary infection. If 50 to 60 per cent of the spores are still to be discharged, as happened in 1928, a 10-day to two-weeks spray must be advised. This was necessary and proved very profitable in 1928. Growers who did not apply this spray promptly during 1923 got severe scab infection, as a three-day rain started about two weeks after petal fall. In some seasons this 10-day to two-weeks application must also be timed for curculio and codling moth control, but that comes a little later in our story.

Reports Must Be Accurate

From the foregoing, one can see that considerable time and energy must be expended by trained observers if growers are not to be led astray in scab spray recommendations. With the State map containing the stage of fruit bud development known for each section, the weather telegram in one hand and the records of scab development in the other, those in charge of scab control must decide what will be told several thousand fruit growers scattered throughout the 88 counties of the State.

Usually several broadcasting areas, each of which contains several counties, can be disposed of with a definite recommendation to spray, or to withhold spraying operations. Occasionally, however, when a broadcast is given on Monday, Wednesday or Friday, some section is on the border line and it must be decided whether to ask the fruit growers to spend several thousand dollars in applying a spray, or whether to risk going through this storm period with their fruit only partially protected. Sometimes there is not sufficient data to decide either way and growers are then asked to listen in on the following day—Tuesday, Thursday or Saturday—at which time more definite recommenda-

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Eight Stages of Blossom Bud Development Early Sprays Are Timed by Bud Development.

Silver Bud — *Early Delayed Dormant* — *Delayed Dormant* — *Late Delayed Dormant* — *Early Pre-Pink* — *Pre-Pink* — *Early Pink* — *Full Pink*

RECENT DEVELOPMENTS IN CODLING MOTH CONTROL

BY C. MORAN

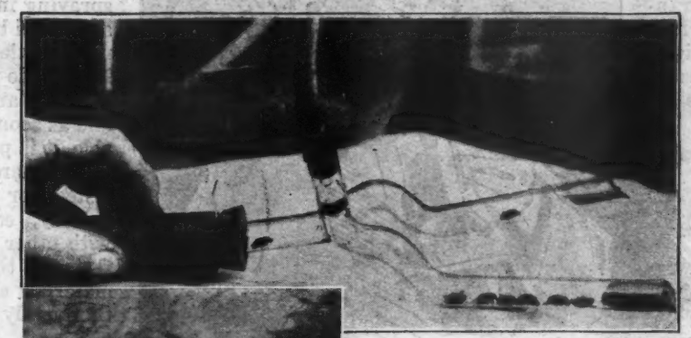
IN A WICHITA, Kans., laboratory an artificial six-mile breeze was blown upon colonies of adult codling moths resting on twigs. The moths refused to move, and continued seemingly motionless for four days so long as the breeze was kept up. The conclusion reached by the investigators was that light winds have the effect of immobilizing the adult moths. This research is expected to help to explain variations in moth abundance in different parts of an orchard, or even on different trees in the same orchard subjected to essentially the same insecticidal treatment.

Extensive tests are being made by the investigators in orchards with various materials to determine their value for codling moth control and as possible substitutes for lead arsenate. At the Wichita, Kans., station many tests of materials as substitutes for lead arsenate have been made in a 25-acre apple orchard, but none of these materials have given results in codling-moth control equal to lead arsenate at one and one-half or two pounds to 50 gallons of spray. Zinc arsenate sprays gave the next best results, though these were far from satisfactory. Aluminum arsenate and calcium arsenate as well as oil sprays were of less value than zinc arsenate.

Similar research at Yakima, Wash., has yielded rather promising results with cuprocyanide, cryolite, and the fluosilicates of barium and potassium, whereas aluminum arsenate and zinc arsenate, even when used with an adhesive such as fish oil, have proved inferior to lead arsenate and difficult to remove from the fruit. The investigators discovered that the use of an excessive quantity of lime with lead arsenate reduces the arsenical residue, though probably this reduces also the control value of the poison.

Nicotine sulphate in combination with oil or other materials has shown some promise in these experiments of being a useful substitute for lead arsenate. In the laboratory, nicotine sulphate destroyed about 50 percent of the eggs of the codling moth. Ten or more days are required to destroy eggs subjected to low temperatures such as are usual in cold-storage houses.

Dr. C. L. Marlatt of the Federal Bureau of Entomology, declares that "Investigations to develop other spray materials will be continued in the hope that something may be found which is less objectionable than lead arsenate, and which will be equally effective against insects and safe for foliage."



Above. A device used to determine the odors that can be used to attract insects. These odoriferous materials, of which geraniol is an example, are produced synthetically, and are used as lures to draw insects into traps or into locations where they may be economically killed by sprays.

Left. A codling moth band after removal from tree, showing cocoons of codling moth trapped by this means (After Pierstorff).

Below. Fruit washing machinery, used to remove spray residue, has been found to fully justify the cost in the improved appearance of the fruit.

In these investigations by the Federal bureau, many stomach poisons and contact insecticides are being tested in a laboratory at Vincennes, Ind. Zinc meta-arsenite has shown a toxicity equal to or greater than lead arsenate, but it is injurious to apple foliage. Under laboratory conditions barium fluosilicate, potassium fluosilicate, and cryolite have proved of value, but results have been less satisfactory in the field. Cuprous cyanide shows a rather high toxicity, nearly equal to that of lead arsenate, but causes some spray injury when used alone. Moreover, it is incompatible with lime-sulphur, nor can it be used with Bordeaux mixture. Fish oil used as an adhesive slightly increases the efficiency of lead arsenate. The addition of sodium bisulphate and aluminum sulphate to nicotine sprays, although beneficial, is attended by serious danger of spray injury.

Nicotine tannate shows considerable promise. Glycerine added to free nicotine increases its efficiency and lengthens its period of usefulness.

Considerable research is being made with regard to the practicability of using the chemically treated, so-called automatic, codling-moth bands. These bands, impregnated with a mixture of beta naphthol and red engine oil of paraffin base, are placed around the trunk and larger limbs of trees, and under them the larvae spin up to pupate. The bands have been tested in co-operation with a number of entomologists over a considerable range of territory, with the following results:

Four types of bands were tested, namely, those made of single-faced corrugated paper, those made of crepe paper, those made of burlap, and those made of cheesecloth. The chemically treated corrugated paper bands appeared to be the most practical, as they harbor the most larvae, give the greatest percentage of kill, do not endanger the health of the trees, and are inexpensive.

Satisfactory results have been obtained with bands treated with one pound of beta naphthol and one and one-half pints of red engine oil. It appears that this formula may be adopted as the standard for band treatment. Some of the toxic coating may be removed by heavy rains, but it is believed that this difficulty can be satisfactorily overcome by adding a metallic soap, such as aluminum stearate, to the standard formula. Although there has been some variation in the results reported by different experimenters in the use of these chemically treated bands, the reports in general are favorable.

EXPERIMENT STATIONS SOLVE FRUIT GROWERS' PROBLEMS

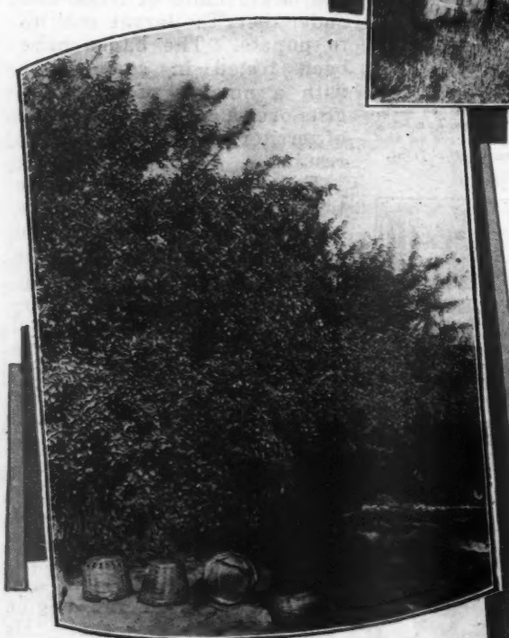
By W. C. DUTTON

THE Michigan Agricultural Experiment Station is made up of divisions that deal with the many problems that constantly confront the agricultural industry. There are many angles to these problems and they are studied as rapidly as funds and personnel will permit. The horticultural interests of Michigan are extensive and varied and present their share of problems to solve. These have to do with production methods and orchard management in general, such as pruning, thinning, soil management, fertilization, pollination, variety studies, propagation, also marketing and economic studies of fruit farm management.

Much work is done at East Lansing, but a large part of the experimental work is done in commercial orchards in the principal producing districts of the several kinds of fruit and on the grounds of the horticultural sub-stations. The older of these is located at South Haven and another at Grand Rapids.

One of the very important phases of fruit production is the control of the insects and diseases that affect the fruit foliage and other parts of the plant. Much of this control work involves the use of fungicides and insecticides. However, before control methods can be developed, there must be an understanding of the life history and development of the many injurious insects and diseases. The various problems involving insect and disease control and the use of spraying materials in general are studied by the sections of horticulture, plant pathology and entomology. The chemistry division handles the chemical aspects of some of the work. A problem is usually studied by one department, but, in many instances, two or more departments work co-operatively.

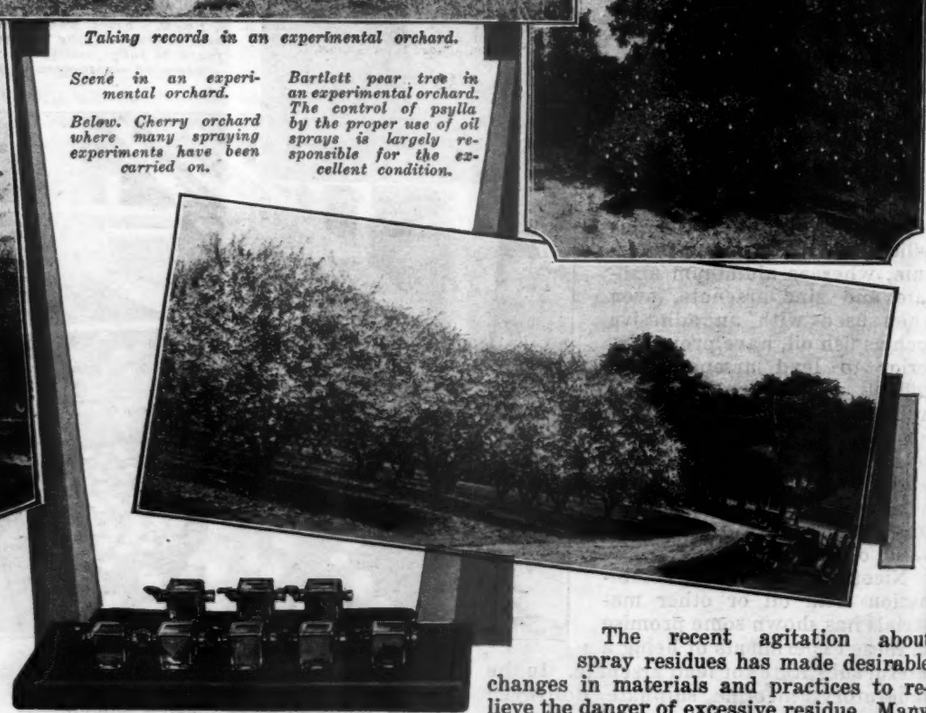
Taking records in an experimental orchard.



Scene in an experimental orchard.

Below. Cherry orchard where many spraying experiments have been carried on.

Bartlett pear tree in an experimental orchard. The control of psylla by the proper use of oil sprays is largely responsible for the excellent condition.



A set of counters used in taking records in spraying experiments.

The testing of new materials and methods is an important phase of the program of spraying investigations. Some of these are suggested by investigators from the experiment stations, but many are the products of insecticide manufacturers.

These are tested as rapidly as possible and as soon as definite information is available, it is passed on to the fruit growers or to the manufacturer. These materials are tested for fungicidal and insecticidal efficiency, ease of handling, compatibility with other materials, and for injurious effects to the host plant. Some of these materials are offered for sale before being thoroughly tested, but many of them are offered only for experimental testing, and if found wanting, are discarded, or, if possible, are improved to overcome the weak points.

The recent agitation about spray residues has made desirable changes in materials and practices to relieve the danger of excessive residue. Many substitutes for lead arsenate have been tested by the entomology department on apples, grapes, and other fruits, and, in this connection, careful studies of other types of materials, such as nicotine sulphate and highly re-

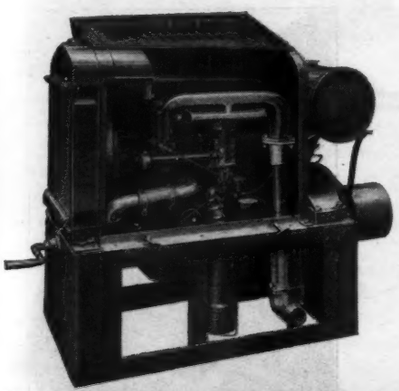
[Please turn to Page 29]

Here Is Low-Cost Power for Every Orchard Job

1831 – 1931
McCormick Reaper
Centennial

McCormick-Deering 10-20 and 15-30 Tractors

These modern, 4-cylinder, wheel-type tractors have built up a wonderful reputation among orchardists, vineyardists, and general farmers. Among the most important and valuable features of these tractors are: removable cylinders, ball-bearing crankshaft, combination manifold, oil filter, air cleaner, fuel strainer, factory-sealed governor, and high-tension magneto.



McCormick-Deering Power Unit—for Pumping and Other Belt Work

Built to International Harvester standards of precision and quality, these heavy-duty power plants willingly do more at less cost, last longer, and serve better. They are available in two sizes: Model 200—25 h. p.—and Model 300—40 h. p. Ideal power for the economical operation of irrigation pumps and for miscellaneous belt work.

McCormick-Deering TracTracTor

The TracTracTor is an important unit in the McCormick-Deering line of orchard tractors. It offers the orchardist all of the dependable performance for which McCormick-Deering Tractors are well known, combined with crawler traction for successful operation in any kind of soil. Unit construction is featured throughout, facilitating servicing operations.

3,000 hours with a McCormick-Deering Tractor

In 1929, Mr. H. C. Lolmaugh of Marysville, Calif., purchased a McCormick-Deering 10-20 Tractor.

In less than a year and one-half this tractor has worked over 3,000 hours, operating under the hardest soil conditions to be found in that district, namely, river bottom silt, dust, and sand.

Mr. Lolmaugh says, "The McCormick-Deering 10-20 has proven a most economical investment, for it is in A-1 shape, the motor never having to be touched, and I have had only to replace one set of lugs and front wheel bearings and two fan belts."

Mr. Lolmaugh's recommendation is typical of the praise offered by McCormick-Deering Orchard Tractor owners. They have tried and found the value of quality construction and the many features used to lower maintenance costs.

Take a tip from Mr. Lolmaugh and many thousands of users and ask your dealer for further information on the McCormick-Deering 10-20, 15-30, narrow-tread Farmall, and TracTracTor. Catalog sent on request.

INTERNATIONAL HARVESTER COMPANY
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606 So. Michigan Ave. Chicago, Illinois

McCORMICK-DEERING
TRIPLE-POWER ORCHARD TRACTORS

HIGH DILUTION SPRAYS PRODUCE CLEAN FRUIT

By F. H. BALLOU and I. P. LEWIS

SPRAYING for prevention of fungous diseases of foliage and fruits of plants, vines and trees was begun, in this country, over 40 years ago. "Bordeaux mixture" was the first fungicide to gain general recognition for efficiency in combating parasitic fungi. Information as to home preparation of this combination of copper sulphate and quicklime was first obtained by American horticulturists, from France, somewhere near the year 1888.

One of the earlier formulas for making Bordeaux mixture which was first used in grape vineyards of our eastern States, constituted a spray which, by fruit growers of the present day, properly would be regarded as of extremely dangerous concentration. Beginning with this formula requiring 12 pounds of copper sulphate and 15 pounds of lime to each 50 gallons of water, the quantities of copper and lime gradually were lessened until, slightly more than a score of years late, a number of State agricultural experiment stations, including our own in Ohio, were advising 4-4-50 proportions of copper sulphate, lime and water in preparation of "standard Bordeaux" for use in spraying apple orchards; and, as well, for such other classes of plants, vines and trees and their fruits which, under favorable seasonal conditions, had proved to possess considerable resistance to "copper injury."

However, the seasons were not invariably propitious for safe employment of the copper-lime compound of 4-4-50 proportions. In prolonged periods of cloudy, rainy, foggy and unseasonably cool weather, injury to foliage and newly-setting or young, growing apples, by use of this formula of Bordeaux, was fully as great as, if not greater than, would have been sustained from the uncombated fungus diseases for control of which these sprays were applied.

Comparative Merits of Standard Bordeaux and Lime-Sulphur Demonstrated

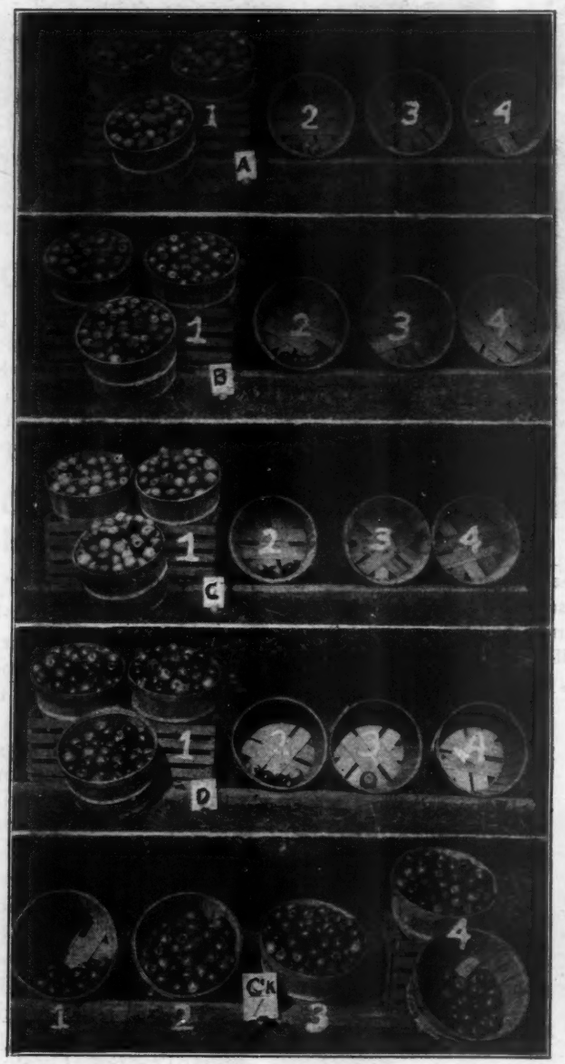
Such was the status of sprays and spraying as related to apple orchard sanitation in Ohio when, 22 years ago and an equal length of time subsequent to the first use of Bordeaux mixture in this country, the department of horticulture of the Ohio Experiment Station initiated the first extensive field comparison, in southeastern Ohio, of the then comparatively new commercial liquid lime-sulphur solution with the so-called "standard" Bordeaux mixture, as fungicides for prevention of apple scab and sooty fungus, and obtained remarkably outstanding results in favor of the newly introduced lime-sulphur spray.

Many orchard owners and others who, in one way or another were interested in spraying, visited our trial orchards in 1910 and were highly pleased with the object lessons so clearly demonstrating the relative efficiency and safety of the lime-sulphur treatment. For, in that particularly unfavorable season, standard or 4-4-50 Bordeaux did its worst in destruction of both foliage and fruit. There were others, however, who, without visiting our test orchards either in 1910 or subsequent seasons, and without giving fair trial to the new lime-sulphur spray, insisted that such results were unthinkable; that lime-sulphur was not a fungicide; and that it could not possibly accomplish what we truthfully reported it had done in our several carefully and conscientiously conducted field tests.

That this attitude of opposition to something really new in the way of a fungicidal spray was really and truly sincere was proved by the fact that it was steadfastly maintained, here and there, for more than 12 years. In the meantime, nevertheless, by far the larger proportion of the apple growers of Ohio and adjacent States had largely discontinued the use of dangerously concentrated Bordeaux mixtures and were succeeding very well indeed by use of the liquid lime-sulphur spray. But the sequel of this long-continued difference of opinion relating to the comparative merits of standard Bordeaux and the prevailing 1-40 lime-sulphur formula was yet to come.

Fungicidal Value of Lime-Sulphur Verified

During the period of 1922-26, inclusive, our horticultural department, in order [Please turn to Page 28]



Average Results for a Five-Year Period in Control of Apple Blotch by Use of Widely Varied Strengths of Bordeaux

(Grades of fruit shown by numerals. 1, wholly clear of blotch; 2, very slightly blotched; 3, badly blemished by blotch; 4, covered and cracked by blotch.)

MATERIALS USED IN SPRAYING: Panel A.—Bordeaux 3-9-50 in pink of buds, lime-sulphur 1-40 at petal-fall, Bordeaux 3-9-50 at 2, 4 and 10 weeks after petal-fall. Panel B.—Bordeaux 2-6-50 in pink of buds, lime-sulphur 1-40 at petal-fall, Bordeaux 2-6-50 at 2, 4 and 10 weeks after petal-fall. Panel C.—Bordeaux 1-3-50 in pink of buds, lime-sulphur 1-40 at petal-fall, Bordeaux 1-3-50 at 2, 4 and 10 weeks after petal-fall. Panel D.—Bordeaux ¾-2¼-50 in pink of buds, lime-sulphur 1-40 at petal-fall, Bordeaux ¾-2¼-50 at 2, 4 and 10 weeks after petal-fall. Panel Ck.—"Check," not sprayed.

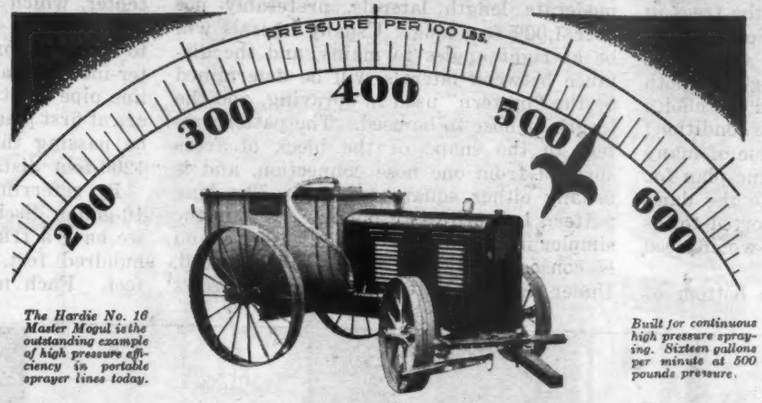
An average specimen of fruit and foliage of the Wealthy apple sprayed with "standard" or 4-4-50 Bordeaux. Photo taken in June. The fruit was badly russeted and the leaves had many brown spots not shown in the picture.

An average specimen of Wealthy showing fruit and foliage wholly uninjured by use of lime-sulphur spray 1-40. Photo taken same day as that of the Bordeaux-injured specimen at the left. (Both photos reduced one-third.)

HIGH PRESSURE SPRAYERS

THAT MEET TO-DAY'S DEMANDS

AUTHORITIES and leading growers in citrus fruit, apple and general fruit culture and in vegetable production agree today on the necessity for extreme high pressure in the application of spray solutions. Low pressure is a thing of the past and the big profits today go to the grower who uses big pressure and capacity in his spraying operations. Speed in spraying, thorough coverage, complete penetration, low spraying cost, an abundant high grade crop—all depend on high pressure.



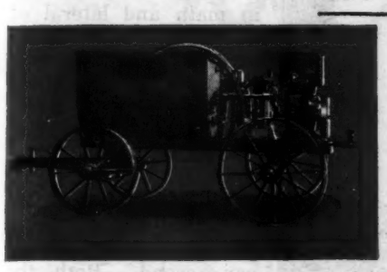
The Hardie No. 16 Master Mogul is the outstanding example of high pressure efficiency in portable sprayer lines today.

Built for continuous high pressure spraying. Sixteen gallons per minute at 500 pounds pressure.

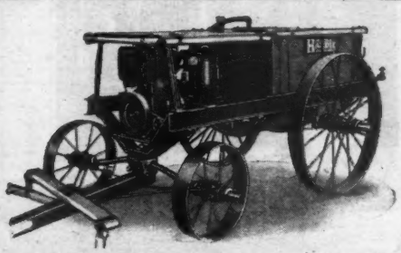
Hardie sprayers have always been known as high pressure sprayers. When you buy a Hardie rated to deliver 350, 400, 500 or 650 pounds to the square inch, you get it *all the time* easily, smoothly, safely, and there is always a big surplus of pressure, power and stamina to call on in emergencies.

The Hardie line includes the new stationary spraying outfits in four sizes, and portable sprayers for orchard, field and garden in a big variety of models and capacities. The Hardie line is so complete that you easily fit your individual needs with the exact size and type required, whether stationary, horse drawn, tractor or truck drawn, with or without dust-proof hoods. Many Hardie outfits are powered by the tractor or truck engine that draws them.

NOT 500 LBS. ON TEST BUT 500 LBS. ALL THE TIME



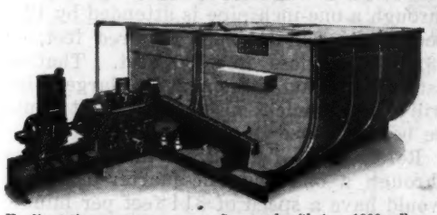
The Hardie Duplex Special is a small Hardie at an amazingly small price, but with big value, ample pressure and capacity for small orchards. Six gallons per minute at 350 pounds pressure. Here is the outfit that the small grower is looking for. Built like the big Hardies. This outfit gives to the small grower for the first time, and at a satisfactory price, all the advantages heretofore enjoyed only by those purchasing larger outfits.



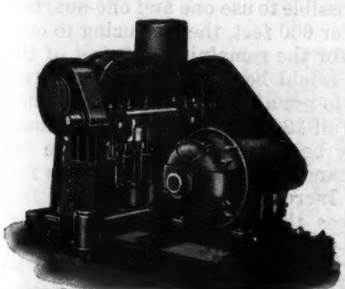
The Hardie cut-under sprayer squarely meets the excessive strains and peculiar conditions under which such models are operated. This sprayer has dust-proof bearings on all four wheels, eliminating excessive wear and providing an easier pull. Frame is of heavy steel rigidly reinforced, 98 inches long and with 56-inch tread. Axles are very tough alloy steel. The tank hangs low. Here at last is the perfect cut-under sprayer.

Hardie row-crop sprayers are made in many models, power and traction operated, and operated by a power take-off from tractor which pulls them. They are made in six sizes for spraying from two to eight rows. The famous Nixon boom is standard equipment. Hardie combination row crop and orchard sprayers embody improvements and refinements which make Hardie the last word in high pressure two-wheeled outfits.

HARDIE STATIONARY SPRAYER



Hardie stationary sprayers are often used with two 1000-gallon tanks to provide a big reserve supply of spray material.



The Hardie No. 21 Stationary Power Unit is typical of Hardie pump construction. Stationary pumps are supplied in models delivering 12-16-21-36 gallons per minute at pressures from 450 to 650 pounds.

THE stationary spraying outfit is the big new thing in horticulture. The ease, speed and economy with which one or two men can spray large orchards and groves and close-set, low-branched trees by this method have firmly and permanently established the stationary outfit in all commercial fruit-growing areas.

Hardie has intensively specialized in the engineering, building and installation of these systems. Any spray pump will last when it is used for 30 minutes at a time only, and allowed to rest and cool while the tank is being filled and drawn to the field, but when the pump is required to run for 5 to 10 hours without a stop and when there is no one around to oil or care for it, as is the case with the stationary outfit, then it takes a sturdy pump such as Hardie makes to stand this constant strain.

Hardie stationary outfits maintain the highest pressures hour after hour and day after day without faltering, and Hardie engineers have completely solved the problem of pressure regulation. When the Hardie stationary outfit is started it delivers the required volume and pressure without attention, interruption or uncertainty every minute the spray guns are turned on the trees.

One or two years to pay—a simple, inexpensive plan

Write for the new Hardie 1931 catalog

THE HARDIE MISTO SPRAY ROD

The Hardie Misto Spray Rod has done more to speed up spray application than any other invention in the spray equipment industry. This marvelous multiple nozzle rod throws a dense, penetrating cloud of spray 30 to 40 feet. It saves about one-third of spraying time. The user of a Hardie Misto Spray Rod gets faster and more thorough coverage. These rods are light, strong and shut off by a short turn without leaking a drop. The handle is made in two pieces and can be used as a long or short gun. Misto rods are supplied with 3, 4, 6 and 8 nozzles. The nozzles are adjustable to any angle giving absolutely accurate direction.

THE HARDIE MANUFACTURING COMPANY
HUDSON, MICHIGAN

Branches at: Portland, Ore.; Los Angeles, Calif.; Kansas City, Mo.; Petrolia, Ont.

HARDIE

DEPENDABLE SPRAYERS

SOME ELEMENTS OF STATIONARY SPRAYING

By D. E. LEWIS

WE HAVE 36,000 apple trees, planted on the equilateral triangle system. Permanent trees are 36 feet apart, but a double filler system was used, making the trees in the rows only 18 feet apart. We could not pass between the trees with a portable sprayer without serious damage to both trees and fruit. We were offered our choice of two methods of remedying the condition: first, to cut out and lose the value of many filler trees; second, to devise some plan for spraying which would eliminate the damage. Pruning could not be resorted to, as both permanent and filler trees would need to be cut back too severely.

We determined to go to the bottom of the stationary spraying system, and accordingly studied most carefully every publication on the subject that was available. By the time we had determined the type of system adapted to our orchard and had the plans drawn up in complete detail, we were confident of a successful working system.

General Stationary Plans

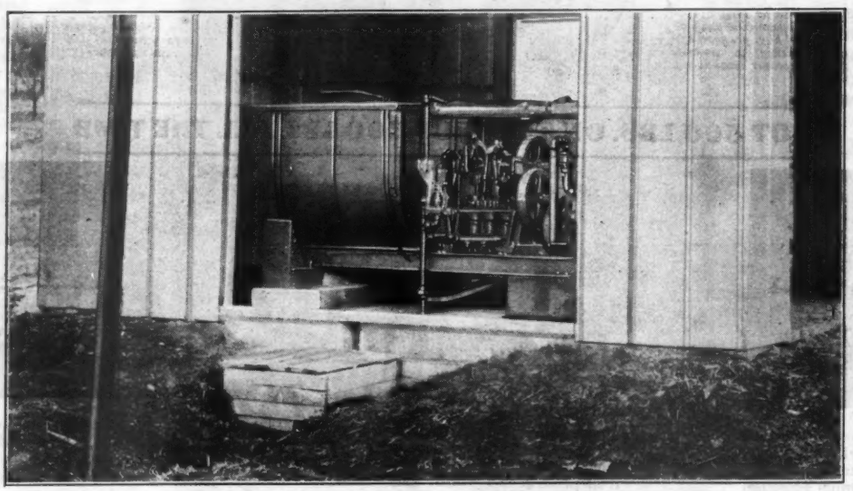
Two general plans are used in piping an orchard. It is generally known that from the power unit, consisting of pump and power, as well as mixing tanks, a system of pipes, designated as mains and laterals, should cover the orchard. The general plans for piping consist of the "return" or "circulating" system and the "dead end" system, the difference being that pipes are provided in the return system to connect the ends of laterals with the pump or the tank, while in the dead end system pipes terminate near the extremities of the sprayed blocks. The dead end system is now most generally used and is considerably less expensive to install.

Pipes have been suspended in the trees, have been placed on the surface of the ground, and have been buried below the ground. Each method has its friends, but our decision was that we might expect if placed in trees broken pipes during hard winds, also probable injury to trees during ice storms. On the surface of the ground, pipes would be in the way; consequently we buried them to a depth of about 15 inches. It is necessary to provide for drainage, as this depth will not protect from freezing during the winter.

Specific Plans

It is better to place the power plant near the center of the orchard and bring water to it, than to force the spray liquid long distances. A permanent location for the power plant, on a firm base, where water is available, and as central as possible, is best. Since it is a permanent location it may best be housed.

Plan pipe lines to provide for long distances through mains, and use short or moderate length laterals, preferably not over 1,000 feet long. Usually laterals will be at right angles to mains, and the distance between laterals will be determined by the "pattern" used in spraying, and the length of hose to be used. The pattern refers to the shape of the block of trees sprayed from one hose connection, and is usually either square or long. The long pattern is much more popular, as it is the simpler in operation, requires less pipe, and is consequently less expensive to install. Under the long pattern, two or more rows



A permanent location for the power plant, on a firm base, where water is available, and as near the center of the orchard as possible, is the best plan.

are sprayed in a block. The blocks extend outward from the lateral row, three, four, or more trees, depending on the length of hose used. If tree rows are 30 feet apart, it would be possible, using 135 feet of hose, to spray four trees on either side of the lateral row, when spraying in two row blocks. This would make laterals fall at every ninth tree row.

Pipe Sizes

When spray guns are used, laterals should practically always be of three-quarter-inch pipe, and the spraying plan should be made to use only one man on any one lateral at one time. If laterals are kept to moderate lengths, and mains are correctly figured, pressure loss should not be excessive. It has been found in practice, however, that the liquid must move through the pipes at a speed of not less than two and one-half feet per second, to prevent settling of sediment in the lines. This makes it necessary to figure not only the pressure loss, but the speed of the liquid, in determining pipes. The two tables herewith will furnish this information.

Let us suppose four men are spraying from one main, each using five gallons of material per minute. The main is 1200 feet long and the laterals 800 feet long. Place two of the men at the extremities of the farthest laterals, and two near the machine, and allow them to spray toward a common center, which would be approximately 600 feet from the power unit. The problem is to arrive at correct pipe sizes. Three-quarter-inch laterals will be used, but the main line pipe must be determined. As the men are at first placed, 10 gallons of solution will be passing through the main to the full 1200-foot distance.

By referring to Table 1, we find for a 10-gallon discharge through one-inch pipe, we have a friction loss of 3.16 pounds per hundred feet, or 37.92 pounds for 1200 feet. Each man will use five gallons of material per minute through a three-quarter inch lateral 800 feet long, which, figured the same way, shows 26.4 pounds friction loss in the lateral, or a combined loss in main and lateral of 64.32 pounds. This is not excessive, but we must also be sure of the speed of the liquid. By referring to Table 2, we find 10 gallons passing through a one-inch pipe will have a speed of 245 feet per minute, or a little more than four feet per second. Both the pressure loss and speed requirements have been met.

As the two men near the machine spray outward, however, it will eventually be necessary for the main out as far as 600 feet to carry 20 gallons of solution per minute, 10 gallons for each set of men. Referring to Table 1, we find 20 gallons through a one-inch pipe is attended by 12.3 pounds friction loss per hundred feet, or 73.8 pounds loss for 600 feet. That is rather high, and if the next size larger pipe will allow sufficient speed of liquid, it would be better to use it.

Referring to Table 2, we find 20 gallons through a one and one-quarter-inch pipe would have a speed of 314 feet per minute or a little over five feet per second, which makes it possible to use one and one-quarter-inch pipe for 600 feet, then reducing to one-inch pipe for the remaining 600 feet of the main. It would be better to use the two sizes than to use a one and one-quarter-inch main the full 1200 feet, as the speed would just barely be above the danger figure for a long distance with the large pipe the full distance. Increasing the pipe for 600 feet also reduces the friction loss, as figured above, for the main in the outlying section, and is, of course, desirable. It should be remembered that there will also be friction loss in the hose, depending on the size and length used, but with a stationary pump capable of holding 450 to 500 pounds of pressure, there should be ample pressure at all points

[Please turn to Page 22]

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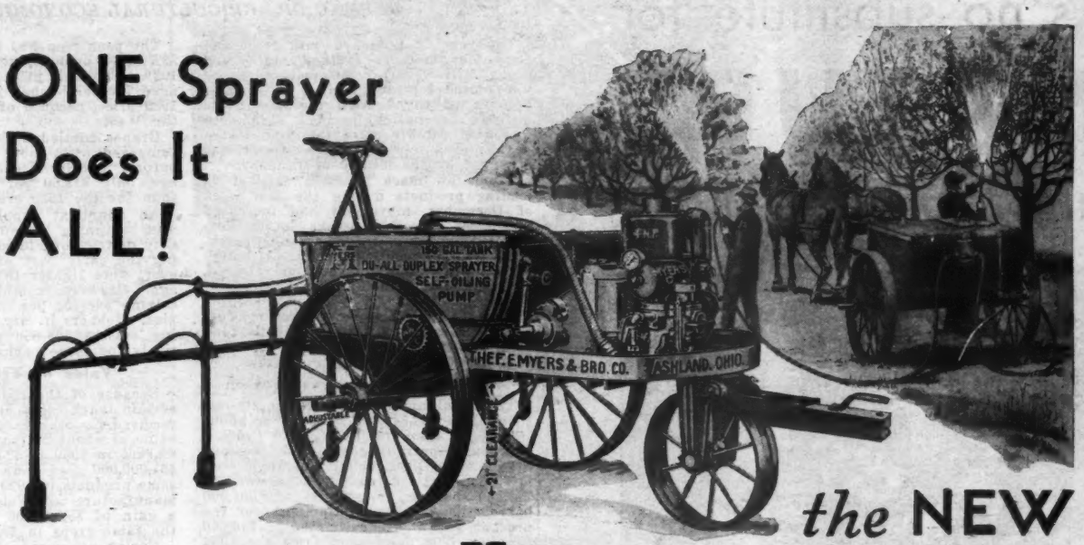

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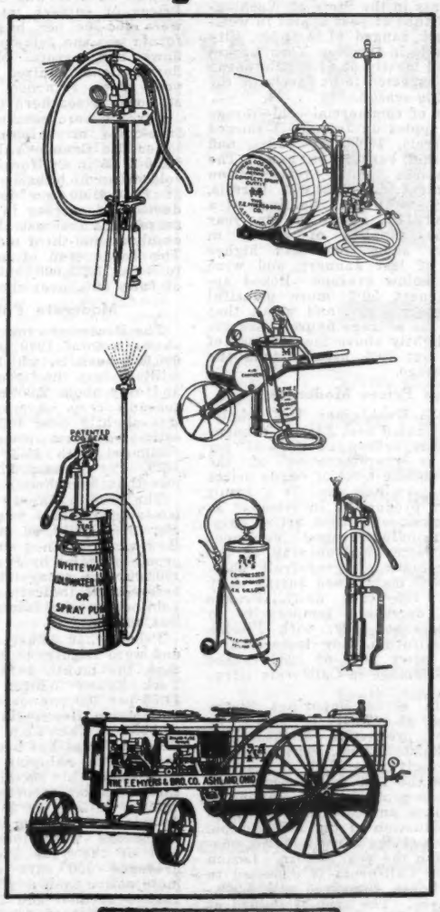

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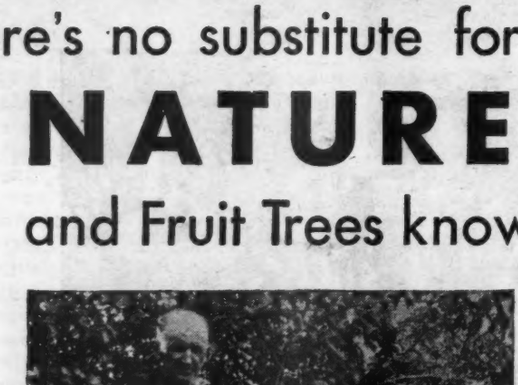

T. E. Smith, Flint Hill, Va., shows you what Chilean Nitrate did for his apples. He used 5 lbs. per tree. Note heavy show of fruit and unusual size.

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THE MONTHLY FRUIT and VEGETABLE REVIEW

By PAUL FROEHLICH

BUREAU OF AGRICULTURAL ECONOMICS

The year 1931 opened with fruit and vegetable markets rather dull and draggy. However, some price-advances were noted for certain lines of produce, because of the limited carlot arrivals during the holiday-period. Shipments increased rapidly after the first of the year, and a downward price-trend was observed by the middle of January.

From low mark of 9,455 cars of 25 leading products during the last week of December, movement had increased to 16,300 cars two weeks later. Forwardings of southern and western truck-crops were becoming heavy. Although official figures had not yet been released, it appeared that the January holdings of 1930 crops in storage would probably be greater than stocks of a year ago. This heavier carry-over would naturally tend to keep prices at a moderate level during the winter and spring months.

More Apples Than Last Season

The total apple crop was finally estimated at 163,543,000 bushels, or about 15% more than the 1929 crop. Production was especially good in the western States. The 1930 commercial apple crop is forecast at 101,169,000 bushels or 33,723,000 barrels, as against 29,004,000 barrels last season. Shipments for the present season are estimated at 110,000 cars, or 7200 more than from the 1929 crop. About 84,000 cars had moved by January 10. Weekly movement was again increasing after the holiday-period and was up to 1700 cars, a large majority coming from the West. Prices showed very little change. Boxes of Extra Fancy, medium to large fruit, were still returning $1.25-$2, f. o. b. shipping points in the State of Washington. Bushel tubs of best apples in western New York ranged $1.25-$1.50. City sales of barrels in the New York market were reported mostly at $4-$6. European markets are expected to be favorable the balance of this season.

The report of commercial cold-storage holdings of apples on January 1 showed 1,196,000 barrels, 19,063,000 boxes, and 5,912,000 bushel baskets on hand. The combined stocks under refrigeration were equivalent to 9,521,000 barrels, which is 20% more than holdings of a year ago and 14% above the five-year average. The supplies of apples in barrels were about one-third higher than those of last January and were nearly 60% below average. Boxed apples were almost 50% more plentiful than in January, 1930, and about that much above the average figure. Baskets were only slightly above the holdings of a year ago but 70% heavier than the five-year average.

Citrus Prices Moderate

Recently the Washington, D. C., wholesale market quoted best Florida oranges and grapefruit selling at $2.25-$3 per box. This is representative of the generally moderate level of citrus prices in all large terminals, and is a result of the heavy production in prospect as well as a result of recent active shipments to consuming-centers. Movement was heavier after the opening of the year and volume of grapefruit shipments was well maintained during early January at 125 cars daily. Orange forwardings decreased temporarily to about 200 cars per day, with Florida exceeding California. Low temperatures during the latter part of 1930 caused considerable damage in California citrus groves.

Oranges in seven important States are forecast at 47,691,000 boxes, as against light production of 33,839,000 for the 1929-30 season. The average farm price is given as $2.11, or scarcely two-thirds of the 1929 price. Grapefruit in four States probably will amount to 14,153,000 boxes, an increase of 3,435,000 over the production of the 1929 season. Average price at the farm is $1.85, one-third less than the year before. Lemon production in California is expected to be 7,020,000 boxes, compared with 5,900,000 last season. The crop is valued at $3 per box.

Other Fruit Crops

The 1930 peach crop amounted to 53,286,000 bushels or 7,500,000 more than the light crop of 1929. Total shipments by rail and important boat lines were 38,540 cars, compared with 35,450 the preceding season. Farm value was only 90c per bushel, or one-third less than in 1929.

The pear crop was finally indicated as 25,703,000 bushels, against 22,963,000 in 1929. The unit price at the farm averaged 76c per bushel, just about half the 1929 price, because of the heavy crop in the West.

Grapes totaled 2,369,000 tons in 1930, compared with about 2,099,000 the year before. The farm price was, on an average, only $18.60 per ton, or $8.25 less than for the 1929 crop.

An abundant supply of strawberries was beginning to move from the Plant City district of Florida. Shipments during the early part of the season, however, were lighter than those of a year ago. Growers, in mid-January, were receiving 38c-40c per quart, or $19c-20c a pint. Jobbers in city markets were paying mostly 50c-65c or 20c-40c respectively for these packages.

Value of Truck Crops

Because of the reduced production of certain truck crops and the lower prices received for others, total estimated farm value of about 20 truck crops grown for market in 1930 is $242,826,000, or about $31,000,000 less than the value of the same products in 1929. Crops grown for manufacture are valued at $66,375,000, a gain of $5,500,000 over the value of the same crops in 1929.

Carlot movement of winter vegetables was rapidly increasing during January. New-crop cabbage shipments were becoming almost as heavy as the movement from northern storages. Forwardings of Texas spinach had reached 60 cars daily and were twice as heavy as last winter. A large crop of some 7,000,000 bushels was expected in Texas. Prices of spinach at shipping points were 45c-50c per bushel basket. California was the principal source of cauliflower and carrots. Movement of cauliflower alone required 55 cars each day; pony crates returned 75c-80c at loading stations in southern California.

Carrots were returning $1.50 per lettuce-crate at shipping points in the lower Rio Grande Valley of Texas, and $1.30-$1.35 in California. Bunched beets sold on an f.o.b. basis in southern Texas at $1.50-$1.60 per lettuce crate. Production of carrots in that district this season was forecast at 1,770,000 bushels, or about one-third more than last year. The Texas crop of beets was expected to total 1,235,000 bushels, an increase of fully 50% over the 1930 crop.

Moderate Potato Crop

The December crop report for potatoes shows a total 1930 production of 361,090,000 bushels, which is some seven millions less than the November report and only about 2,000,000 more than last season's crop. Average yield per acre was slightly over 106 bushels, and the estimated farm price was about 90c compared with $1.31 in December of 1929. Per-capita production is but little less than 3 bushels.

The crop in the 19 surplus-producing late-potato States was 246,525,000 bushels, or only 19,000 more than in 1929. However, combined shipments from this group of States by January 10 were only 100,200 cars, as against 107,000 the year before, thus indicating probably heavier holdings on the farms this winter than last winter.

Prices had fluctuated considerably and were slightly higher in mid-January than the month before. Western New York Round Whites recently brought $1.55 per 100 pounds at shipping points, and Maine Green Mountains have held at $1.40. The f.o.b. range in North Central States has been $1.20-$1.45, with far-western shipping districts quoting most sales at 90c-$1.15. The Chicago carlot market reported northern Round Whites selling at $1.45-$1.60 per 100 pounds, and western stock at $1.80-$1.90. Shipments were increasing after the first of the year and by mid-January averaged 700 cars daily. Maine was more active than any other State. Idaho ranked second, and the North Central group was third.

A light movement of early potatoes was reported from Florida and southern Texas. The 100-pound sacks of Texas Triumphs were jobbing at $2.75-$3, and bushel hampers of Florida Spaulding Rose brought $2.25-$2.50. Red potatoes from Bermuda had declined in New York City to a jobbing range of $8.50-$9 per barrel. Condition of the Florida crop averaged 78% of normal on Janu-

ary 1 and the Texas crop about 70%. Florida acreage is decreased this season to 26,700 acres, compared with 31,000 last year and 22,000 acres in 1929. The decrease is entirely in the northern part of the State. The lower valley of Texas reports 16,060 acres, as against 15,000 last season. The fall crop in Texas was forecast at 210,000 bushels, or fully four times as many as last season.

Fewer Sweet-Potatoes

The final report on 1930 sweet-potatoes was reduced slightly to 71,154,000 bushels, compared with 84,521,000 in 1929. Yield per acre averaged only 85 bushels, and the December 1 farm price was 91c per bushel, or 4c less than last season.

By January 10, about 13,000 cars of sweet-potatoes had been shipped, with Virginia and Tennessee exceeding all other individual States. Movement to the same time last season was 16,400 cars. A sharp price-advance early in the year was followed by a subsequent decline. By the middle of the month, the jobbing range in most city markets was $1.25-$2.50 per bushel. Shipments had decreased temporarily to only 60 cars per day.

Onion Markets Weak

Although the official report of onion holdings had not yet been released, there seems no doubt about the abundance of supplies. Shipments increased lately to a daily average of 120 cars, and prices declined at important eastern and northern shipping-points to a range of 75c-85c per 100-pound sack of yellows, with 50-pound bags at 35c-45c. On the Western Slope of Colorado best Yellow Danvers brought only 50c-55c per 100 pounds. The 3-inch minimum Valencia-type onions in Arkansas Valley returned $1.30-$1.35. Values nearly everywhere were lower than at the opening of the year. Plantings of Bermuda-type onions in southern California are down to 1200 acres this spring, as against 2050 last season and 3450 acres in 1929. Southern Texas is increased to 19,580 acres, or about one-fifth more than last year. Early onions in three States together showed a condition averaging 83% of normal on January 1, or four points higher than condition a year ago.

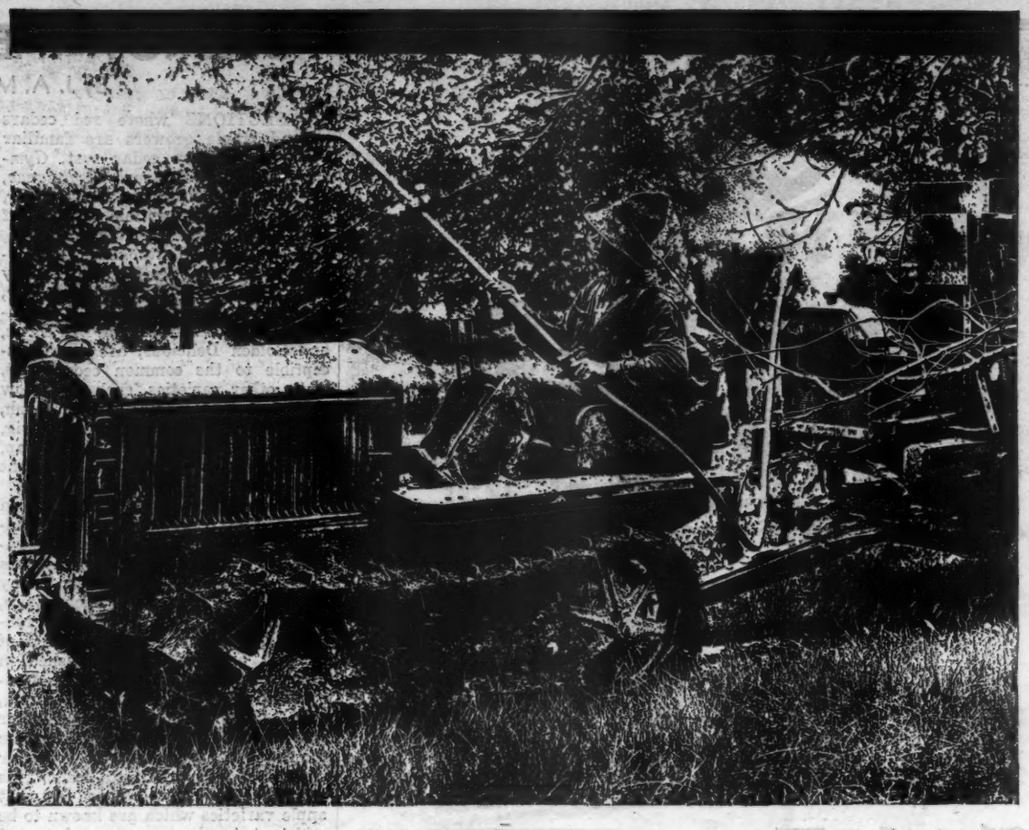
Cabbage Active

Movement of new southern cabbage was becoming quite heavy, with 70 cars daily from Florida and Texas together. Old-crop movement was averaging about 120 cars daily. New York and Texas were the two leading States for cabbage. An abundance of new-crop is expected during the next few months, as condition in five early States averaged 81% of normal, compared with 70% at the same time last season. Prices of storage stock had declined to $14 per ton bulk, f.o.b western New York points, with Wisconsin shippers getting $9-$10. City values have not shown great change, but new-crop arrivals should naturally tend downward in price. Rio Grande Valley f.o.b. sales were lower at $1.40-$1.50 per lettuce crate. The Texas crop is expected to be heavy.

Lettuce and Celery

The Arizona winter-lettuce season was near an end, with a record of about 4000 cars shipped by mid-January. This is approximately one-third more than moved last winter. Imperial Valley of California will now be the only important source of Iceberg-type lettuce until the spring movement from Arizona. Shipments from Imperial Valley had already exceeded 100 cars daily, and were heavier than at this time last season. About 10 cars daily were moving from Florida, but this is Big-Boston lettuce. Cash-track prices of crates of 4 to 5 dozen heads strengthened in Imperial Valley to a range of $1.35-$1.50, and city sales were made mostly at $2-$3.25. The 1½-bushel hampers from Florida jobbed at 75c-$1.50. The Imperial Valley crop registered a condition 90% of normal on January 1.

New York celery was finished. Approximately 5400 cars had moved from that State, compared with 3850 last season. Florida was becoming active, but bulk of the recent supply has been from California. Cold weather damaged the California crop to some extent. The 10-inch crates were returning $2-$2.50 in Manatee section of Florida. Large crates brought $2.75-$3 in southern California. Terminal-market prices held fairly well. Total shipments were averaging about 125 cars daily. Florida is reported to have a crop of 2,167,000 crates, or about one-fifth less than in 1930, while the spring-crop in California is increased slightly to 626,000 crates. This early celery showed a field condition 81% of normal in January.



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DESTROY THE RED CEDARS

By J. A. McCLINTOCK

IN SECTIONS where red cedars abound, apple growers are familiar with the common cedar rust, *Gymnosporangium Juniperi virginianae*, not only as it appears on the cedar, but also upon susceptible varieties of apples.

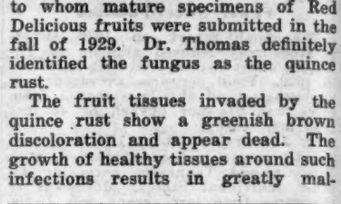
The fact is well established that certain apple varieties, such as Early Harvest, Early Ripe, Red June, Fanny, Wealthy, Jonathan, York Imperial, Rome Beauty, Black Ben Davis, and Golden Delicious, are quite susceptible to the common cedar rust, while other varieties, such as Yellow Transparent, Duchess, Maiden Blush, Grimes Golden, Mammoth Black Twig, Paragon, Red Delicious, Red Winesap, and Stayman Winesap, are resistant to this rust.

On the basis of this difference in susceptibility, growers have been advised against planting susceptible varieties in sections where red cedars might prove a source of infection by the common cedar rust. Such advice, however, sound as it seems, is rendered questionable by the findings of Thomas and Mills, as published in Memoir 123, Cornell University Agricultural Experiment Station, March, 1929. They have shown that other species of rust fungi, as well as the common cedar rust, have the red cedar and the apple as alternate hosts. This is further complicated by the fact that apple varieties which are known to be resistant to the common cedar rust may be susceptible to other species of rust fungi, such as the quince rust, *Gymmosporangium germinale*.

An example of such a condition occurred in a commercial orchard in Tennessee in 1929. Red Delicious, Red Winesap, and Stayman Winesap, three supposedly resistant varieties, were attacked by a rust in this orchard. In May, when the writer visited the orchard in question, he found many young fruits of these three varieties with deformed areas, chiefly near the blossom end. Although this location of the infections on the fruits was similar to that of apple fruits attacked by the common cedar rust, the fact that these varieties are considered resistant created doubt as to this being the common cedar rust.

As the Red Delicious fruits were most advanced, specimens of this variety were sent to the Plant Disease Survey of the United States Department of Agriculture. Rust specialists who examined the specimens agreed that the infection was due to a rust, and suspected it to be quince rust, as this species was known to have attacked Red Delicious fruits in other States. These suspicions were later confirmed by Dr. H. E. Thomas, to whom mature specimens of Red Delicious fruits were submitted in the fall of 1929. Dr. Thomas definitely identified the fungus as the quince rust.

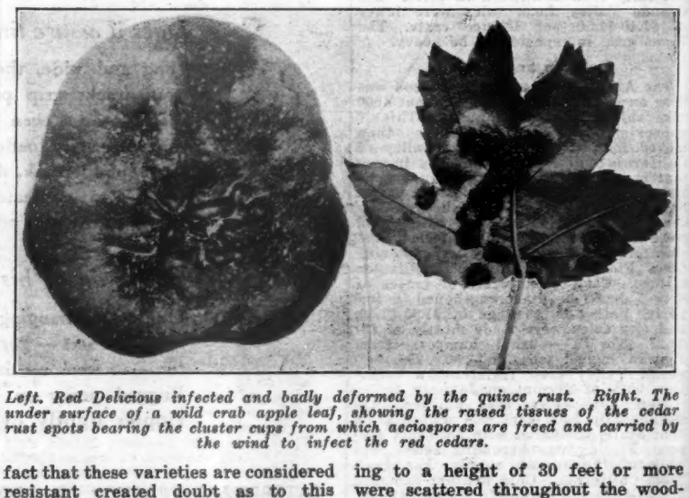
The fruit tissues invaded by the quince rust show a greenish brown discoloration and appear dead. The growth of healthy tissues around such infections results in greatly malformed fruits at harvest time. Even when fruits are mature, rust-infected areas are a dark green color, and show none of the bright orange discoloration common to fruits infected with cedar rust.



"Cedar apples" on the red cedar. On April 26, 1929, there occurred a light fall of rain, followed by heavy rains on April 27 and 28. Examination of red cedars on April 29 disclosed the cedar apples as shown above, with masses of gelatinous spore horns exuded.

In order to gain information on which to base control measures, the writer, in January, 1930, again visited this commercial orchard where quince rust infection had been serious. The deciduous trees were then free from leaves and the cedars were easily discernible. Cedars of all ages and sizes abounded in the vicinity of the orchard. Some were only a few rods from the apple trees, and many towering to a height of 30 feet or more were scattered throughout the woodland to a distance of half a mile. They could easily have infected this 10-year-old apple orchard. The relation between the rust infection on the apples and the alternate host in the near-by woods was apparent.

The loss due to quince rust infection in 1929 in this commercial orchard in Tennessee furnished conclusive evidence to the owner that the



Left. Red Delicious infected and badly deformed by the quince rust. Right. The under surface of a wild crab apple leaf, showing the raised tissues of the cedar rust spots bearing the cluster cups from which aeciospores are freed and carried by the wind to infect the red cedars.

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destruction of all red cedars on his farm, and on adjoining farm lands where permission could be obtained, was justifiable.

In the light of these findings, the possibility of several rust fungi being in a given area should be considered before the selection of varieties for new commercial plantings is definitely determined.

New orchards are coming into bearing each year in apple growing sections of the southern States where red cedars are abundant. Regardless of the varieties planted, the owner's best insurance against losses due to one or more rust fungi, is the destruction of the alternate host, the red cedar.

Future Trading in Potatoes

On January 12, the Chicago Mercantile Exchange opened trading in potato futures, with a view to establishing for the first time in history a year-around open market where potatoes could be bought and sold at the market, every trading day in the year.

Inauguration of the trading more than justified the hopes of the exchange officials that the market would prove active. In the first week, nearly 340 cars of Idaho Russet standards for March delivery were traded in. The open commitment showed a steady increase from day to day and the constant inquiries which reached the exchange gave reason to expect that the market would continue to display activity.

The U. S. No. 1 grade is used as the basis for the exchange contract, with the additional provision that the potatoes must not be screened with the larger potatoes removed. Margin of $120 per carlot is required from both buyer and seller, the trading being in carlot units of 36,000 pounds and the prices on the boards being in dollars and cents per hundred pounds.

The March delivery opened trading at $1.95, advancing to $2 on the first day and dropping under the selling orders later in the week. The second week of trading opened with 36 cars sold, prices holding around $1.88.

By far the largest amount of interest displayed in the new trading has been from the Idaho potato men, naturally, but growers and handlers of other varieties also are arranging to take advantage of the trading to insure their crops.

Before the March delivery has run its course, the exchange expects to open a contract for fall delivery. It is also contemplated that a contract in other varieties will be opened later in the year, if sufficient demand is aroused from the potato men. Numerous requests in this direction have come in.

Large-Scale Insect Trapping

In the summer of 1929 approximately 17,500 Japanese beetle traps baited with geraniol were used by the United States Department of Agriculture in lightly infested areas, and in 1930 the number was increased to 25,583. The department recommends trapping only where there is a light infestation. The baited traps attract beetles from a great distance and if used in heavily infested areas would draw abnormal numbers from neighboring properties to the property where the traps were used. The cost for bait and for operating the traps was $1.66 per trap in 1929 and $1.63 in 1930.

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Furthermore, an ordinary "B" battery assembled of separate, independent cells (be they round, square or any other shape) needs 60 solderings and 29 fine wires, making 89 places where trouble can develop. The flat cells in an Eveready Layerbilt, however, make connection with each other automatically. Only five solderings are needed, and only two broad connecting bands, each 3/8 inches wide. This means the utmost in reliability.

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SUMMER OIL SPRAYS IN THE MIDWEST

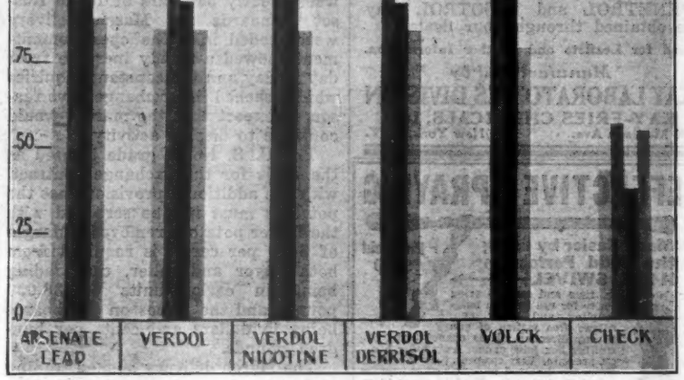
By W. P. FLINT

THE question of the value of summer oils in the spray schedule is one that is being asked at the present time by many of the midwest orchardists. The results obtained from experimental work in Illinois may be of some help in answering this question.

For the past four seasons the Illinois State Natural History Survey, in co-operation with the Illinois Agricultural Experiment Station, has been conducting a series of orchard tests on the control of the late brood of the codling moth by the use of the so-called summer oil emulsions. The results of these tests show that under midwest conditions a very fair degree of late brood codling moth control can be obtained by spraying with properly made summer oil emulsions, but that this control is not quite equal to that obtained by spraying with arsenate of lead.

No attempt has been made to make our own oil emulsions, those used being the two brands of summer oil emulsions which are most widely sold in Illinois, namely Volck and Verdol. Some small tests have also been run with some of the other oil emulsions, including Ovex and Summer-Mulsion. These emulsions may be considered as typical of summer oil emulsions, and were so taken, and not for the special brands but as types of summer oil emulsions.

Two or three sprays for second and third brood moths were applied each season, depending on the locality and the development of the insect during the season. Certain plots in all cases were sprayed throughout the season with arsenate of lead. A very careful check on the results was made at harvest time each year by carefully examining several thousand apples from each plot. In all cases the men making the examinations were ignorant of the treatment used on the plots which they were checking.



Each set of vertical bars shows the results obtained from the different sprays and checks over a three or four-year period. The height of the bars represents the per cent of fruit free from worms.

The accompanying chart shows graphically the degree of codling moth control obtained each season and also the infestation in the untreated check plots.

Tested Four Years

These tests have now covered the seasons of 1927, 1928, 1929 and 1930. The weather during these years has varied greatly and we have had extremely hot and dry seasons as well as rather cool and decidedly wet seasons. During all of these years the results of the oil spray tests have been very consistent. The tests from which our results have been obtained have been run in commercial orchards located in western, south central and southern Illinois. During each year the tests have been run in orchards in both the central and southern part of the State. The varieties on which the sprays have been used have been principally Ben Davis, with some tests on Kinniards, Stayman Winesap, Jonathan and Grimes.

In most cases the sprays have been applied with the owner's rig under the direct supervision of or by one of the men from the Natural History Survey staff or the experiment station. In all cases the regular applications of arsenate of lead for the control of the first brood codling moth have been made. At the time of the second brood sprays, which in Illinois comes from the last of June to the middle of July, depending on the season and the locality, arsenate of lead has been discontinued and the plots have been sprayed with two per cent oil emulsions.

Control of Late Broods

After carrying on these rather large spray tests for four seasons, we have a sufficient amount of data so that we can feel quite sure of our results. Judging from these figures, we would say that under midwest conditions codling moth can be controlled by the use of late brood sprays of the summer oils but that the degree of control will not be quite as good as that obtained where arsenate of lead is used throughout the season.

During the fall of 1930, analyses of 19 samples of apples sprayed with three to four pounds of arsenate of lead to 100 gallons of spray material for first brood codling moth control, and with oil sprays exclusively for second brood control, did not show spray residue in excess of the amount tolerated by the Federal government, and in all but one case the amount of residue was well under the so-called world tolerance.

Under certain conditions, that is during times of very high temperatures, summer oil emulsions may

cause some burning of the fruit and foliage. This same statement is equally true of nearly all of our orchard sprays. Under the extreme drought conditions of 1930, some burning from oils occurred, especially on the south and southwest sides of the trees. No such burning occurred during the seasons of 1927, 1928 or 1929.

In 1930 a number of our Illinois commercial orchardists sprayed with oil for the control of second brood codling moth. During the fall a check on the codling moth infestation was made in 62 orchards, 30 of which had been sprayed with arsenate of lead throughout the season and 32 of which had been sprayed with arsenate of lead for first brood codling moth control and with summer oils for second brood control.

There was, as is to be expected, a wide variation in the results obtained, not only where oils had been used but also where arsenate of lead had been used throughout the season. In the 30 orchards using arsenate of lead throughout the season, there was a variation in codling moth infestation of from 1.4 per cent to 47 per cent, and in the 32 orchards using arsenate of lead during the first part of the season and oils for late brood codling moth control, a variation in infestation of from one per cent to 58.5 per cent occurred. The average differences were not very great, as shown by the following table:

Schedule	No. of records	No. of orchards	Ave. per cent wormy fruit
Lead all season.....	35	30	15.1
Lead early—oil late....	34	32	16.2
Average of all tests....	69	62	15.6
Difference favoring lead			1.1

As will be seen, the difference in favor of arsenate of lead was less than two per cent. Judging by the results in our experimental blocks which have been very carefully sprayed and a record kept of the amount of spray materials applied, the dates of application, direction of wind, and other factors bearing on codling moth control, we would expect that arsenate of lead would give from two to four per cent better control than that which would be obtained by the use of oils. The growers' results are a little better than this, and these seem quite significant when we consider that nearly all these growers used oils for the first time during 1930. Had they used arsenate of lead for the first time, the result would probably have been in favor of the oils.

Summary of Results

Summing up the results of our four seasons' careful tests of summer oil emulsions, it seems that under mid-west conditions these sprays offer one of the most promising, if not the most promising, substitute for arsenate of lead, and it is entirely possible that these sprays may be further improved so that they will give a better control than arsenate of lead for late brood worms and will also greatly reduce undesirable spray residue left on the fruit at picking time. The question of the effect of the use of summer oils on the health of the tree cannot be definitely answered until further work has been done. A rather large series of tests along this line is now under way.

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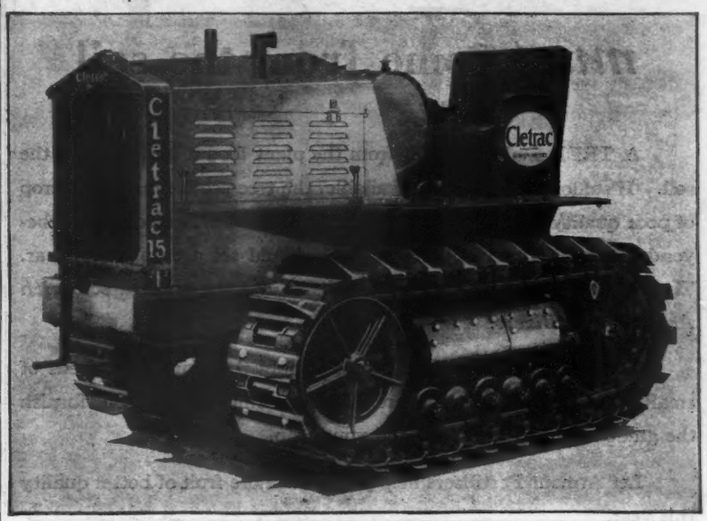

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SOME ELEMENTS OF STATIONARY SPRAYING

[From Page 14]

when the spraying is planned to take advantage of pressure loss and if pipes as suggested are used.

The laterals may be taken off the mains with crosses or Y's as preferred, the former offering the greatest friction. Immediately after leaving the main, a gate valve, then a union should be placed in the lateral. Under this arrangement any lateral can be cut off and repaired while the rest of the system is in use. We also placed gate valves and unions in the mains, just as each main left the power unit, for a similar reason. Gate valves should be used in all pipes where valves are needed, and if pipes are buried, ground joint unions are best.

Laterals are laid along tree rows at a distance of from five or six feet up to 12 or more feet, depending on the age of the trees and the danger of injuring roots when pipes are buried. At intervals, determined by the pattern used, stub pipes, called risers, are connected to laterals by means of T's, and terminate near the tree, where they are out of the way of cultivation and mowing. Each riser is equipped with a cut-off valve, and it will be found economical to use a good type of quick coupling, so that the hose may be snapped on and off quickly. As the pipes are laid, T's should be placed at all low points and provided with plugs for draining the system.

How to Use the System

The correct method of using the dead end system is to fill all of the pipes with water, bring up the pressure, and then, with the men wasting water at their different starting points, spray liquid should be pumped in driving the water out. As soon as the spray liquid reaches each man, he connects his hose and starts spraying. At night this procedure is reversed, water being pumped into the lines, allowing all the spray material in the pipes to be sprayed on the trees. Finally all lines in use during the day are opened at the terminal and blown out under high pressure. At the finish of each spray, not only the terminals of all laterals are blown out, but each riser is also thoroughly flushed in our orchard. We have had no trouble with any sediment, of Bordeaux and lead, or lime-sulphur and lead, forming in our pipes, and believe we will not have any trouble so long as we clean our pipes as described above.

We have saved fully 40 per cent of our labor bill since installing our stationary systems as compared with spraying our orchard with portable sprayers. We are also in position to put extra men at work, and can speed up spraying to a little over half the time required for spraying with portable machines. We believe that this feature saved us around 25 cars of fruit last season, and naturally we would not be willing to go back to portable sprayers. Regardless of wet ground, spraying can proceed whenever the trees are dry enough to receive the spray materials. Our men can wear rubber boots and spray right through soft places that would defy a portable sprayer.

The cost of our installation was approximately $30 per acre, as we had some material on hand. Costs in different sections and according to different methods are reported all the way from $35 up to $50 or more per acre for complete installation. The system has proved to be an excellent investment for us, and we predict that within a few years, stationary systems will largely replace the portable outfits in the central section, just as they have replaced around 90 per cent of the portable sprayers in the West.

TABLE 1

Loss in Pressure Due to Friction, in Pounds per Square Inch, per 100 Feet

Gallons Discharged per Minute	Diameter of Pipes ¾ In.	1 In.	1¼ In.	1½ In.	2 In.
5	3.3	0.84	0.31	0.12	
10	13.0	3.16	1.05	0.47	0.12
15	28.7	6.98	2.38	0.97	
20	50.4	12.3	4.07	1.66	0.42
25	78.0	19.0	6.40	2.62	
30		27.5	9.15	3.75	0.91
35		37.0	12.4	5.05	
40		48.0	16.1	6.52	1.60

TABLE 2

Rate of Flow of Liquid, in Feet per Minute

Gallons per Minute	Quantities of Flow ¾ In.	1 In.	1¼ In.	1½ In.	2 In.
5	218	122½	78½	54½	30½
10	436	245	157	109	61
15	653	367½	235½	163½	91½
20	872	490	314	218	122
25	1090	612½	392½	272½	152½
30		735	451	327	183
35		857½	549½	381½	213½
40		980	628	436	244

Chris L. Christensen has tendered to Chairman Legge of the Federal Farm Board his resignation as Secretary of the Board, effective in the early spring. Mr. Christensen will leave the board to become Dean of the College of Agriculture and Director of the Agricultural Experiment Station of the University of Wisconsin.

The report of the Secretary of Agriculture, for the year 1930, is now available for general distribution. Copies are obtainable from the Department of Agriculture, Washington, D. C.

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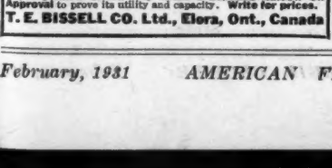

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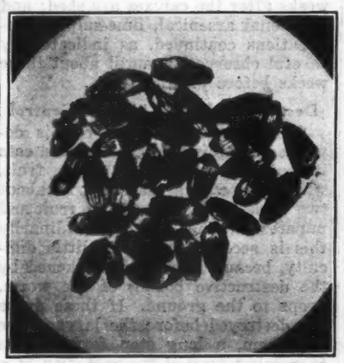
THIS picture is a micro-photograph of *Trichogramma minutum*, one of the most promising of the 45 different kinds of insects which are known to attack and feed upon the oriental fruit moth. This little insect is so small that 10 to 12 of them could easily be placed on the head of a common pin. This parasite is being reared in several States and by the Federal government. Nearly a million were liberated in the peach orchards of southern Illinois last year.

The eggs of the Angoumois grain moth are used for rearing the *Trichogramma minutum.* A micro-photograph of these eggs is shown in the lower picture.—*W. P. Flint, State Natural History Survey Division, Urbana, Ill.*



Tennessee Growers Meet

The annual meeting of the Tennessee State Horticultural Society, held in Nashville on January 13 and 14, was well attended from start to finish and the program proved to be one of interest to all. The talk by Mr. Stimpson on grading was received favorably.

The fruit growers had a very enjoyable time at their annual dinner. D. E. Hedges, orchardist of Signal Mountain, was toastmaster.

The newly elected officers of the association are: Dr. Hy M. Carr, president, Harriman; Robert Parker, vice-president East Tennessee, Kingston; Fleming Rainey, vice-president Middle Tennessee, Columbia; J. S. Matthews, vice-president West Tennessee, Jackson. The two newly elected directors are R. S. Hommel, Knoxville, and E. M. Dement, Cortner. G. M. Bentley was re-elected secretary and treasurer

The convention city for next year is Harriman, which is in Roane county, in the heart of the commercial fruit growing interests of the state.—*G. M. Bentley.*

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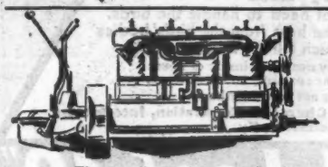

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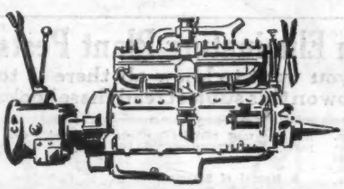

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M. J. MATHER, Advertising Manager, Room 182, 54 W. Illinois St., Chicago, Ill.

THE PERENNIAL PROBLEM OF THE WORMY PEACH

[From Page 6]

milk of lime, in order to control the brown rot fungus, which shows at this early stage in a condition of blossom blight. If a dust is used, a lime-sulphur preparation containing from five to 10 per cent arsenate of lead is recommended.

Curculio Activity Greatest When Calyxes Are Shedding

At the time when the dried calyxes or shucks are being cast off from the young peaches, the overwintering beetles have emerged in their greatest number, feeding upon the young fruit and puncturing the skin for egg deposition. A thorough application of spray or dust—using the same mixtures given for the first summer application, except for the substitution of self-boiled lime-sulphur or dry-mix preparations in place of the milk of lime—should be made at this time. The lime-sulphur ingredient is most important in all these summer applications as a check for the destructive brown rot fungus, which enters, and soon ruins, the growing fruit as an inevitable consequence of curculio injury.

A neglect of proper coverage at this time of the calyx shed, when the curculio is most active, may result in irreparable damage to the fruit. If left undisturbed, a female curculio in good form will deposit anywhere from 300 to 500 eggs during the two months of her summer activity.

A follow-up spray or dust application, similar in composition to number two, should be made 10 days or two weeks after the calyxes are shed; and additional arsenical, lime-sulphur applications continued, as indicated by careful observation, until about three weeks before picking time.

Destroying Drops Aids in Control

A few days after the egg is deposited, the larva hatches out and eats its way into the center of the fruit, where it reaches maturity in about two weeks. It then leaves the fruit and pupates in the ground. Ordinarily this is accomplished with little difficulty, because the fruit, weakened by the destructive boring of the worm, drops to the ground. If these drops are destroyed before the larvae have left them, a long step forward has been taken toward the reduction of a second brood.

The larva buries itself two or three inches under the ground, forms a cocoon and pupates. In about a month's time it emerges as an adult beetle of the second brood. If, due to an early spring and favorable conditions of temperature during the midsummer period of pupation, the second brood adults emerge prior to the ripening of the fruit, we have a second infestation—one which we are often powerless to check with arsenate of lead because of the nearness of harvest.

The curculio, in its adult form, feeds on the fruit and leaves of the peach tree—it also infests the plum, cherry and apple—until cool weather drives it into weeds and brush adjacent to the orchard for its winter hibernation.

The Oriental Peach Moth

The other fellow we have to consider in the wormy peach condition is the oriental peach month. Unlike the curculio, the oriental peach moth passes its winter period of hibernation in the larval state—encased in a cocoon, which can be found on the ground close to the fruit tree which it infests. Pupation occurs early in the spring, and emergence as an adult moth takes place at about the time when the overwintering curculio first begins its seasonal activity. The female moth lays its eggs—as many as 200—on the under surfaces of the peach leaves, and, after a short period of incubation, the small larva enters the new growth close to the leaf axil and bores downward through the center of the twig. As the new growth hardens and the young fruit develops, the larva forsakes the former for the latter, entering the peach through or at the stem, and boring down to the pit like the curculio larva. At this stage the oriental peach moth larva is often mistaken for that of the curculio. However, they can easily be told apart: the former is pink in color while the latter is white.

Seven Generations Produced in a Season

The fully developed moth larva leaves the twig or fruit after a somewhat shorter period of feeding than required by the curculio, forms a cocoon on the ground, on the tree trunk, or, as is often the case, on the fruit itself. Pupation and emergence of the adult follow rapidly in the warmth of midsummer. As many as seven

(To top of next Page)

"WONDER TOUR" WINS SUPPORT

The "Wonder Tour" of American Fruit Grower, as announced in the January issue of this magazine, has apparently struck a responsive chord in the hearts of fruit growers throughout the eastern and middle western States.

The original plan was for a ten-car, all-Pullman train, but this plan may have to be enlarged. Arrangements are under way to bring one car from a point in New York, probably Rochester, and another from either Washington or Philadelphia, to accommodate the many eastern growers who have announced their intention to take part in the tour.

For the convenience of growers in the middle west it may be possible to start one or two cars from Kansas City, these being attached to a regular passenger train to St. Paul or Minneapolis where they will be attached to the American Fruit Grower special train.

Additional information will be given in these columns in succeeding months as to the high points of the tour. It is suggested that all who may plan to avail themselves of the opportunity to take part in this educational and sight-seeing tour make inquiry at the earliest possible date.

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generations may be produced in a single season.

Controlling the Pest

Unfortunately, no effective means of control have yet been devised for this pest. Though it is a chewing insect, the larva has the clever habit of spitting out the first few mouthfuls it takes from the surface of the fruit. A surface poison, such as arsenate of lead, therefore, will not do. A number of chemical preparations have been tried, but with only indifferent success.

The following are some methods of oriental peach moth control which have proved of value: (1) The cutting off and burning, during the early summer, of all infested twigs; (2) the gathering up or disking under of infested drops; (3) early spring cultivation to break up winter cocoons; (4) frequent stirring of the soil close under the trees, during the summer, to prevent pupation; (5) the use of paradichlorobenzene around the base of the peach tree in the fall to kill larvae hibernating in cocoons on the lower trunk or on the ground close to the tree; (6) spray or dust applications of concentrated hydrate of lime; (7) spray applications of nicotine sulphate.

Supplementary Measures in Plum Curculio Control

Returning again to the curculio. It is pretty generally recognized that arsenate of lead applications alone will not effect a satisfactory control of this pest, particularly after a mild winter, early spring and excessive late spring rains. Supplementary measures are very necessary.

One of the most important of these is the destruction, by burning, if possible, of all trash, brush, weeds, etc., in or adjacent to the orchards, in which adult curculios may hibernate through the winter.

During summer seasons of unusual prevalence, much good may be accomplished by the jarring method of eradication. This is done by jarring the trees with a stout pole and catching the falling weevils in a wide cloth-covered frame. The insects can then be killed by immersing in kerosene. Jarring is an effective but laborious method of control. In large orchards a complete coverage at regular intervals might well be prohibitive. In such cases it would be well to confine the operation to the outside rows.

The destruction of wormy drops in early summer is another very important means of supplementary control as a check on the second brood. As it is next to impossible to gather up all these drops by hand in an orchard of any size, the most economical method is the practice of disking and dragging close under the trees during the period of the June drop. It may be true that disking under will not always prevent the curculio from continuing its life cycle, but repeated stirrings of the top soil at this time, preferably with an extension springtooth harrow, will break up many of the cocoons formed close to the surface of the ground, and in this way accomplish a great deal of good. The working of the top soil should be continued as late as possible to insure the best results.

Fourteen years after the Japanese beetle was first discovered in the United States near Riverton, N. J., the most remote point at which the insect has established itself is at New Castle, Pa., an air-line distance of 285 miles from the site of the original infestation.

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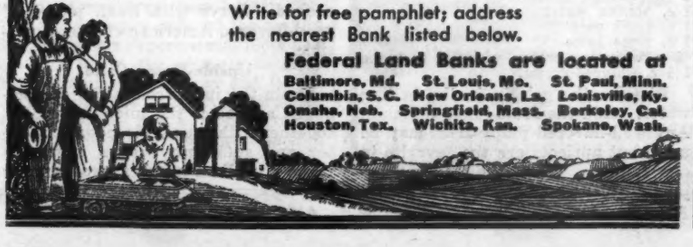

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CHATS WITH THE FRUIT GROWER'S WIFE

By HAZEL BURSELL LINDBERG

FRUITY FAVORITES

HAVEN'T you often wished for a few new and different yet practical ideas for fruity desserts and salads? A recipe for a new pie or cake, pudding or salad which will prove tantalizingly good and at the same time be supremely simple to make.

In the writer's career as an ardent and devout collector of innumerable recipes, certain "tried-and-trues" have come to light which have proved unfailingly successful with family, friends and foes. We shall call them our "Fruity Favorites." Some may be old, some are new and some are old with a new touch. All have the well-known "it" quality hitherto associated only with sheiks, sirens and cinema stars. Do they intrigue you? We shall begin with

Dutch Apple Cake

2 c. flour	1 t. salt
2 T. shortening	2-3 c. milk
1 T. baking powder	1 egg
3 T. sugar	Apples

Beat the egg with the milk in the mixing bowl until well mixed, sift in the measured dry ingredients, add the melted shortening and beat until of a smooth consistency. Pour into greased and lightly floured square pans to a depth of not more than one-third of an inch. Arrange pared and cored eighths of well-flavored apples in rows or in any manner desired, imbedding them slightly in the dough but taking care that the dough does not cover them. Sprinkle the top generously with white sugar and nutmeg. Bake in a medium-hot oven until the apples are cooked and the dough is delicately browned. Cut in squares and serve while fresh and warm with plain cream.

Delicious Prune Whip

Whip one pint of whipping cream until thick, but still smooth. Fold in 10 fresh marshmallows cut in quarters, then fold in 18 large canned Italian prunes cut in small pieces, together with enough juice to color the dessert a delicate pink without making it thin. Heap in sherbet glasses and serve cold. This may be varied by adding one-fourth teaspoon of almond extract, or one-fourth cup of chopped walnuts or blanched almonds. Cooked, dried prunes may be used for the whip but the color and flavor are not quite so good. Garnish with finely chopped nuts.

Eight-Hour Salad

8 slices pineapple	1 c. whipping cream
½ lb. marshmallows	1 T. vinegar
¼ lb. blanched almonds	

Cut the pineapple, marshmallows and almonds in small pieces. Whip the cream until about half whipped, add the vinegar and finish whipping. Add the pineapple, marshmallows and nuts. Let stand in the ice box or other cool place for eight hours or longer. Serve with salted crackers or thin buttered slices of nut bread.

Fruit Bavarian Cream

1 pkg. lemon gelatin
1 c. boiling water
1 c. fruit pulp
1 c. fruit juice
¾ c. whipping cream, whipped to make 1½ c. whipped cream.

Dissolve the gelatin in the boiling water. Add the fruit juice and chill. Any well-flavored pulpy fruit may be used, but apricots are the favorite in our family. When the mixture begins to thicken, beat until light and fluffy and almost snowy white. (This beating takes quite a bit of time, so this dessert should not be attempted the last minute.) Fold in the fruit pulp and lastly the whipped cream. Let stand until it begins to get firm, heap into sherbet glasses, chill and serve either plain or with a garnish of whipped cream as desired. For a festive occasion, the bavarian may be shaped in an interesting mold, turned out on a large plate and served with a garnish of halves of apricots and whipped cream.

Best-Ever Fruit Sherbet

3 oranges, juice	3 c. sugar
3 lemons, juice	1-pt. rich cream
3 bananas	Whole milk

Extract the fruit juices, strain, and combine with the banana pulp and sugar in a large bowl. Add the whipping cream and enough whole milk to make three quarts. (Recipe will fill a gallon freezer three-fourths full—all that can be used as the mixture expands in freezing to fill the freezer.) Pack and freeze, using two parts of ice to one part of coarse salt. The finer the ice is crushed the quicker the mixture will freeze. When it begins to turn harder, remove the paddle, etc., cork the freezer, drain the brine that has collected (without removing the freezer from the outside tub) and pack full with ice and salt. Cover with an old blanket or other insulating material and allow to stand until wanted. Packing is unnecessary when it is to be eaten at once. Pineapple juice (about ½ c.) may be substituted for the bananas, as may peach or apricot pulp. But the combination given produces the most tantalizing flavor imaginable. For a two-quart freezer, use one half of the recipe.

Spiced Apple Tapioca

½ c. minute tapioca	3 c. tart apples
	1 c. sugar
1 t. salt	1 t. cinnamon
1 qt. boiling water	½ t. nutmeg
2 T. butter	

Cook the tapioca and salt in the boiling water until tapioca is clear (place in upper part of double boiler after it starts to thicken). Place a layer of cooked tapioca in a buttered baking dish, then a layer of pared and sliced tart apples and sprinkle with sugar and spice. (More nutmeg may be used and the cinnamon omitted, if desired.) Then add successive layers of tapioca and apples until all the ingredients have been used. Bake in a slow oven until apples are tender. Serve warm with plain cream.

Raisin and Cranberry Pie

This combination fruit pie has been widely acclaimed by all who have tried it. For one medium-sized pie, grind or chop one cup of seeded raisins and two cups of washed and picked over cranberries. Line a pie pan with rich pastry, fill with the chopped fruit and mix in one cup of sugar. Cover with pastry and bake in a hot oven for 10 minutes, then in cooler oven until the fruit is cooked. Serve with small pieces of good-flavored American cheese, if possible.

Upside-Down Cake

Drain the juice from a can of pineapple, and place the juice in a skillet together with four tablespoons of butter and sufficient brown sugar to make a medium heavy syrup. Simmer slowly until the sugar is dissolved. Just before adding the cake batter, arrange as many slices of pineapple in the syrup as the skillet will hold in one layer. Prepare the batter as follows:

2 c. flour	2 eggs
2 t. baking powder	½ c. butter
	½ c. milk
1 c. sugar	1 t. vanilla

Cream the butter, add the sugar and cream again, then work in the beaten eggs and finally add the milk and sifted dry ingredients alternately. Add the vanilla, beat well and pour over the pineapple and syrup. Bake in a moderate oven (about 360 degrees Fahrenheit) for 45 minutes. Turn out on a large plate and serve at once with a garnish of whipped cream.

Spiced Prune Cake

¾ c. butter	2 c. flour
1 c. sugar	1 t. soda
3 eggs	1 t. each cinnamon, allspice, nutmeg
3 T. sour cream	
½ c. hot water or prune juice	1 c. finely chopped or mashed prunes

Cream the butter and sugar and add the eggs well-beaten. Sift the flour once, measure and sift two more times. Add the soda to the cream, mix well, and blend in with the cake mixture. Then add liquid and flour alternately, and finally add the spices and mashed prunes. The dried prunes should be sweetened slightly in the process of soaking and cooking. Beat until well-blended, then bake in buttered loaf pan in a moderate oven for approximately one hour.

Salad Combinations

We have several favorite simple fruity salads, in addition to the usual fruit salad, made up with a variety of fruits in combination. An especially favored one is made by combining diced celery and small cubes of Spitzenburg apples, marinating with the juice of half an orange and sweetening to taste. Serve with a lettuce and raisin garnish and no other dressing. Another is stuffed prune salad, made by removing the pits from selected cooked dried Italian prunes, or better still, canned Italian prunes and stuffing them with cottage cheese. Arrange three stuffed prunes on a lettuce leaf for individual service. You may serve mayonnaise dressing if so desired. Halves of canned pears are likewise delicious when stuffed with cottage cheese.

Another salad which is especially pleasing to the eye as well as to the palate is an orange and carrot combination, made by mixing orange juice and pulp with grated carrots. (Be sure that some of the juice escapes to blend with and season the carrots.) Serve with mayonnaise or boiled dressing and garnish with one large black seeded raisin, making a color scheme of brilliant orange with black.

We could continue indefinitely with these favorite recipes should space permit. All we have given herein are noted especially for their fine flavor, and they have the additional advantage of being simple to prepare.

Table of Equivalents

1 t. equals 1 teaspoonful
1 T equals 1 tablespoonful
1 c. equals 1 cupful (½ pt.)
1 pt. equals 1 pint (2 c.)
1 qt. equals 1 quart (2 pt.)
1 oz. equals 1 ounce
1 lb. equals 1 pound (16 oz.)
1 pkg. equals 1 package

NEW CHERRY PEST

(Continued from Page 7)

have been swept by fire. Naturally such trees, with their root systems impaired and their vigor seriously injured, go into the winter in a badly weakened condition. Low temperatures consequently often cause heavy losses.

After feeding on the leaves during the early summer, the larvae become fully developed about the middle of June. They then attach their protective cases to the upper surfaces of the leaves and go through the pupal stage, which lasts about 30 days. The moths emerge about the middle of July and have been observed within a few hours of emergence to lay tiny eggs, much smaller than the head of a pin and slightly brownish in color, promiscuously on the lower side of the leaves.

Difficult to Control

An insect with such feeding habits is not easy to combat. Arsenical sprays are useless, for the pest lives in its protective case and obtains its food by excavating between the two surfaces of the leaves. But by a thorough investigation and by testing out dozens of oil emulsion sprays, it was found that it could be effectively controlled with a spray during the early spring, just as the insect comes out of its dormant winter period and before the buds burst. At this time the proper oil spray penetrates the protective covering of the case bearer and smothers the pest. However, if the spray is applied later, after a fringe of tender green appears on the buds, injury is liable to result. If applied too early the rapid evaporation of the spray is likely to result in injury to the tree from dangerously low temperatures. And if applied at too heavy a rate, globules of oil are formed between bark and buds. This oil may penetrate into the tree, cut off the food supply of the buds, and result in serious injury.

Oil Emulsion Spray Perfected

During the first year of the investigational work in which the life cycle of the insect was studied, an oil emulsion spray was perfected that could be used in combating its ravages.

The spray, a cold mix oil emulsion, is prepared by pouring four to six gallons of water in a tank for each hundred gallons of spray. The engine on the spray rig is then started and one pound of calcium casinate added and thoroughly mixed by the agitator in the tank. Eight gallons of refined cheap lubricating oil are then poured into the tank and mixed by keeping the engine running and pumping the spray through the nozzle back into the tank. When the spray is well mixed, water is added to make 100 gallons, thus making an eight per cent oil emulsion. Further investigations have shown that a six per cent spray will give satisfactory results and is cheaper and less dangerous to the trees. The engine should be kept running while driving from the orchard filling station to the orchard itself. If the engine should stop for more than 15 minutes, the oil will separate from the water and the spray will be unsafe to use.

When applying the spray, care should be taken to cover both sides of the trees and to use approximately two gallons of oil spray to each 18 or 20-year-old tree. Younger trees should receive smaller amounts. All trees should be thoroughly covered so that their branches are coated but not drenched with the spray. A supplementary spray made of three pounds of arsenate of lead and 50 gallons of water also helps considerably if applied just as the case bearers begin to move to the buds for their first meal in the spring. Later sprays are ineffective.

It is best to spray from the ground instead of from above, because the branches on which the case bearers hibernate are more thoroughly covered when the emulsion is shot upward than when applied from the top of a spray rig.

Last year 347 barrels were used in the commercial orchards, or a total of over 17,350 gallons. An extensive campaign was conducted and about 3000 acres of cherry orchards treated with outstanding success.

In estimating the effectiveness of the oil emulsion as a means of controlling the cherry case bearer, Dr. Granovsky speaks only of the results obtained on his experimental plots and leaves it up to the growers to state their opinion of the spray and its effectiveness. But in every case where it was applied not a single grower failed to get almost complete control.

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Because—next to their surpassing standard of QUALITY, backed by a national chemical reputation of nearly a century, is the constant UNIFORMITY of Grasselli Spray and Dust Products in insect and fungi control — unvarying year-in and year-out. Their toxic effectiveness will never disappoint . . . used according to directions . . . they always assure you of a sure "kill". ¶ When you critically examine the buying habits in the commercial fruit growing sections, why do you find the *careful* growers spraying with GRASSELLI? ¶ And more significant still, why do they select it continually year after year? ¶ Think it over. ¶ For prompt service, there's a Grasselli dealer near you . . . if not, write us.

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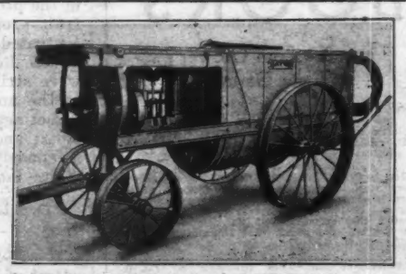
Reach the topmost branches with a pest killing mist. It seeks out and destroys every crop-robbing disease. With the super powered Hayes No. 4124 atomization is so complete it reaches crevices only air can reach. Solutions go farther—substantial, economies result. Hayes underslung sprayers are designed for universal use; cut under wheels are particularly adapted to sandy soil and hills. Spray anywhere a team or tractor can travel. There is a Hayes Pump for every requirement. Send for free literature describing both power and hand pumps. Tell us what your particular sprayer problem is—we can help you solve it.



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53 W. Jackson Blvd., Chicago

5% Discount on 2 or more books

HIGH DILUTION SPRAYS PRODUCE CLEAN FRUIT

[From Page 12]

either to verify or disprove the results obtained in our carefully made comparison of Bordeaux and lime-sulphur sprays a dozen years before, decided and arranged to repeat the test as nearly as possible, in the same quarter of the State in which the initial experiments had been painstakingly conducted.

To shorten a long story, it may be stated that this new project throughout its five-year course, served only to emphasize in every particular the results obtained in the original experiment occurring in the period of 1910-14.

Various Bordeaux Formulas Tested

Therefore, deciding to increase the proportions of high grade hydrated lime, in all Bordeaux formulas, to three parts by weight to one part of copper sulphate, we used on separate plots of generous size, both in combating apple blotch and apple scab, Bordeaux formulas of 3-9-50, 2-6-50, 1-3-50 and ¾-2¼-50 proportions of copper sulphate, lime and water. In one plot, in apple scab prevention tests, we used a 1-5-50 Bordeaux throughout each of the five seasons that the experiments were continued. In another a 1-5-50 Bordeaux mixture for the pre-bloom applications and a ½-2½-50 formula for all after-bloom sprays including that at the time of petal-fall.

The results of these experiments were both interesting and significant. The five-year average percentages of perfectly blotch-free and scab-free Rome Beauty apples obtained by employment of these widely varied formulas of Bordeaux mixture, applied with careful regard to TIMELINESS and THOROUGHNESS, but without wastefulness, actually were as nearly uniform as if all plots had been sprayed with a single formula. In illustration of this fact, let the reader glance for a moment at a little table of figures showing the five-year average percentages of wholly blotch-free apples obtained in our Washington county project in which blotch was a most serious factor with which to contend:

In control of apple blotch	3-9-50 Bordeaux gave 99.5 per cent of clean fruit
	2-6-50 Bordeaux gave 99.6 per cent of clean fruit
	1-3-50 Bordeaux gave 99.2 per cent of clean fruit
	¾-2¼-50 Bordeaux gave 98.6 per cent of clean fruit
The unsprayed or check plot gave	11.3 per cent of clean fruit

It thus may be seen that there was a variation of only 0.6 of one per cent in the proportions of absolutely sound fruit produced by the two more concentrated as against the two more dilute Bordeaux's. However, there were strikingly important differences in the amount of foliage injury and russeting of fruit in the different plots; and these differences were tremendously in favor of the extremely dilute Bordeaux mixtures.

Dry Lime-Sulphur Included in Experiments

It was fortunate, indeed, that at the outset of our series of experiments in spraying, beginning in the spring of 1922 and ending in the autumn of 1926, that we decided to include the relatively new dry lime-sulphur as a spray in comparison not only with Bordeaux mixture, but commercial liquid lime-sulphur. For up to that time there had been but little work done in Ohio, experimentally, with the dry or powdered form of this compound, and reported results from these few small tests were not such as to encourage orchard owners to use the dry product as a spray. However, from the very beginning of our work in the five-year period of experiments above referred to, dry lime-sulphur used at the rate of three or four pounds to each 50 gallons of water for pre-bloom sprays, and two or three pounds for all after-bloom applications, gave equally as fine results in prevention of scab and sooty fungus as did the commercial liquid form of this compound used at the usual rate of one and one-fourth gallons to 50 gallons of water. Moreover, the dry lime-sulphur caused little or no foliage injury or blistering of fruit during the summer season when temperatures were high at the times of spraying. Then, too, we noted that the fruit grown on the test plots sprayed with dry lime-sulphur invariably was somewhat smoother in finish than where the commercial liquid form was used in the usual formulas of 1¼-50.

An Effective Spray for Scab Control

Also, during the five-year period of spraying tests in southeastern Ohio, beginning in 1922, a new dry lime-sulphur, hydrated lime spraying program for the apple orchard was in progress in our department's work in central Ohio. This program, as originally outlined, provided for 3-5-50 or 4-5-50 proportions of dry lime-sulphur, high grade hydrated lime and water for pre-bloom applications, and 1½-5-50 or 2-5-50 proportions of the same materials for all after-bloom sprayings including that at the time of petal-fall, lead arsenate, as a matter of course, to be used in conjunction with the fungicidal sprays at the proper periods for insect control.

So remarkably effective and highly pleasing has this spraying program proved in control of apple scab; so remarkably harmless and clearly invigorating to foliage and fruit; and so conducive to production of apples of beautifully smooth, glossy finish and fine color, that this dry lime-sulphur, hydrated lime combination has been continued in use for nine successive years on the same plot of Rome Beauty trees at our own Dale View Test Orchards in which it was first used, with constant and increasing satisfaction. Several hundreds of horticulturists of Ohio and nearby States viewed this plot of trees with keenly marked interest on the occasion of the summer meeting of the Ohio State Horticultural Society, held at Dale View Test Orchards in August, 1930.

Moreover, this program of spraying, after only three seasons' trial, simply from what visiting orchardists saw of its safety and efficiency, began to escape from the confines of its origination and spread to other orchards, large and small, not only in Ohio, but in neighboring States.

As a matter of course, there were those, again, who promptly found a very great deal to condemn in this mild, harmless, but strangely potent spray; but this frankly expressed criticism, apparently, has exerted little influence in retarding its adoption and successful use by orchardists in many parts of our country.

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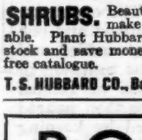

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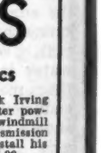

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STATIONS SOLVE GROWERS' PROBLEMS

(Continued from Page 10)

fined oils, have been tested as possible substitutes for the arsenicals in the control of codling moth.

Insect Problems

One of the serious problems of apple growers in some parts of the State is the control of the codling moth, and attention is being given to this. The life history of the moth, with special reference to its emergence, the proper timing of sprays and the number required, the method of application, etc., are all being studied in this connection.

The cherry and apple maggots have become pests of major importance during recent years and since they are very difficult to control, extensive studies will be required.

The pear industry of the State has suffered heavy losses from the injury caused by the pear psylla. Experiments have been in progress for several years with the use of oil sprays in the dormant period, and more recently the highly refined or so-called "summer oils" have been included for summer applications. These are studied not only from the point of view of psylla control, but with regard to their effect on the fruit and foliage and on the growth of the tree. Some oils cause russeting, some blotch the fruit and foliage, and there may be some indirect effects. The oils differ widely in this respect, some causing very little or no trouble.

Fruit Diseases

Michigan is a relatively heavy producer of raspberries, both red and black, but this industry has been imperiled by the serious prevalence of diseases. Extensive field and laboratory studies of these diseases have been made. This work includes studies of the types of diseases found, mode of transmission, effect on plant, varietal susceptibility, the relation of temperature to their appearance, etc. Another experiment has to do with the effect of anthracnose on production and the benefits to be gained by control, either by spraying or sanitary measures.

Root rots of strawberries have been under investigation, likewise fireblight of apples and pears. Experiments are in progress with the virus diseases of the peach, as peach yellows, little peach, and some other similar troubles that have developed seriously during recent years. Cherry leaf-spot is another disease that is receiving attention at the present time.

Spray Injury and Its Effects

We spray to control insects and diseases and naturally the first logical question to ask about any material is, "Will it be effective under severe conditions?" A material, to kill an insect or a fungus, must have some toxic principle, and since we are dealing with living matter in the tree or plant as well as in the pest we are trying to kill, it is not hard to imagine that injury to some part of the host plant might occur. It is desirable to have an ample margin of safety between the point where the pest will be killed and where injury to the plant will occur. The margin is amply wide in some instances, in others it is variable according to prevailing conditions, and with some materials the possibility of injury is taken as a matter of course.

Many of the new materials that were mentioned in a preceding para-

(To Page 33)

For Dependability
Select "FRIEND"

"FRIEND" sprayers have proven dependable through many spraying seasons. When warm weather forces the buds and blossoms, and when the sprayer must be in operation from dawn till dark—then the "Friend" will prove its name.

LOW tanks, easy draft, cut-under chassis, alemite and oil bath pump lubrication, few working parts, sturdy construction make this possible.

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Write for your copy.

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CONTROL MANY PESTS

WITH ONE SPRAY AT LOW COST AND LESS TROUBLE

ORTHO
SCIENTIFIC PEST CONTROL

USE KLEENUP FOR

- ...*San Jose Scale*
- ...*Red Mite*
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- ...*Apple Scurfy Scale*
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FOR REAL PROTECTION against San Jose Scale, European Red Mite, Leaf Roller, Pear Psylla, Peach Cottony Scale, Aphis, and various other insect pests, spray your trees with KLEENUP, the proven oil spray for dormant and delayed dormant use.

No other type of spray has so wide a range of pest control. And no other type of spray does the work at so little cost!

Moreover, KLEENUP is pleasant to use, free from the burning and blistering of face and hands that accompanies the use of caustic sprays.

Combines with Lime-Sulphur

KLEENUP MIXES with hard or soft water. Combines easily with Lime-Sulphur or Bordeaux for use as both a fungicide and insecticide.

KLEENUP is noted not only for its effectiveness and great economy, but for its wide margin of safety for the trees. Effectiveness, economy and safety are due to the superior quality of oil used in its preparation and to the unique method of emulsification, which insures stability in the tank, instant release of the oil when it hits the tree, uniform coverage of the sprayed surface, and very little loss of oil in the drip. The oil sticks and the water runs off!

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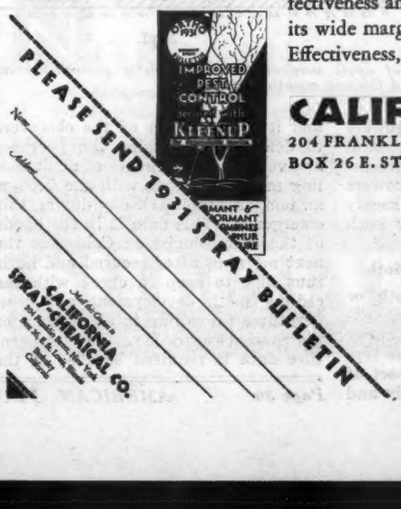

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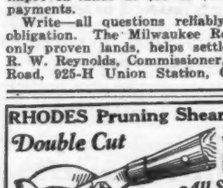

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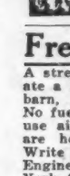

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New—Fireproof—Convenient
Near West Philadelphia Station
P. R. R.

SPRAY SERVICE ON THE AIR [From Page 8]

tions will be given. A special forecast is then made for those doubtful sections. Accurate weather forecasts are essential for a successful scab spray information service.

Spray Information Broadcast During Noon Hour

Through co-operation of the Western Union Telegraph Company, a spray report of 500 to 700 words is sent directly into the broadcasting studio in typewritten form in from 15 to 17 minutes after the recommendations are prepared. There men versed in the fruit growers' terminology put it on the air at a definite time during the noon hour. Sometimes it happens that a grower misses the broadcast and he then calls his neighbor by telephone or the county agent's office, or the State office by long distance.

That fruit growers avail themselves of this information is evident from surveys made in a number of counties and from the fact that they frequently write and ask that their spray questions be answered during the next broadcast. This also serves to keep us in touch with their problems.

To verify the observations sent us by co-operators and to collect more technical data on scab development as related to fruit bud development, several technically trained men are kept in the field during the critical scab spray period. This also serves to give radio listeners more confidence in the spray recommendations. If at any time growers think they are not getting the correct information for their particular orchard, they are urged to follow their own conviction, for after all it is their investment which is at stake. An effort is made to give them the basis for the spray decisions and if their conditions are different they can use this information to reach a correct decision for their particular situation.

The seasonal development of the fungi causing cherry leaf spot and Brooks' spot is studied in much the same manner as apple scab, and this information is relayed through the radio and by letter. These studies saved a large number of growers extra sprays for Brooks' spot control during 1930. During 1928 Brooks' spot cost the Ohio apple growers about $1,000,000, and they are keenly interested in avoiding another such calamity.

X-ray Turned on Codling Moth

The control of the codling moth, or prevention of the wormy apple, constitutes another phase of the spray service work which the college is trying to give the grower. No insect of the apple can increase so rapidly and do so much damage as the codling moth if the fruit grower does not apply his sprays at the proper time or in the proper manner. The spray service aims to make available to the fruit grower all possible information that will enable him to properly time his codling moth sprays.

A few years ago our Ohio spray schedule for the first brood of codling moth worms instructed growers to apply their sprays at petal fall and again two or three weeks later. It was supposed that the "2 or 3 weeks" spray would reach the trees just in advance of the hatching of this brood of worms. Studies made by the entomologists in Ohio during the past five years show that growers cannot depend upon a definite calendar schedule to have their codling moth spray properly timed. Many growers still follow the spray calendar recommendations, but as a rule these growers are not getting as good control as those who apply their sprays to fit the season and the development of the insect.

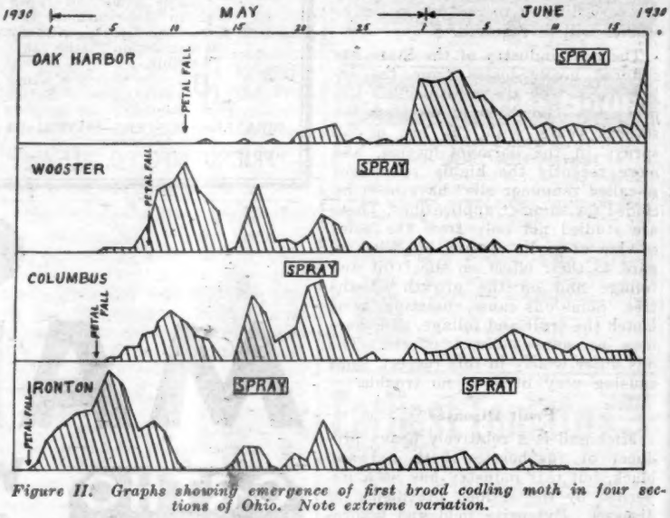

Figure II. Graphs showing emergence of first brood codling moth in four sections of Ohio. Note extreme variation.

Trained Observers Stationed at Important Points

In order to give this spray service, trained observers are stationed in five strategic points throughout Ohio. These points are located in the center of the main fruit growing sections and it is the object of the observers to definitely determine the progress and volume of emergence of adult codling moths, together with the 7:00 p. m. temperatures each day during this emergence. This data is in the hands of the entomologist at Columbus the next morning after secured and he is thus able to keep in check with the codling moth development and temperatures prevailing in all sections of the State (Figure II). The temperature data is required because of the fact that codling moths will not lay eggs when the evening temperature is below 62 degrees Fahrenheit. Egg laying progresses slowly from 62 to 67 degrees, and above 67 degrees egg laying is taking place in considerable numbers nightly, providing the moths have been emerging previous to this time.

Temperature Influences Time of Moth Emergence

With this data at hand, the spray service announces when the first cover spray should be applied. It is interesting to note that in 1928 the first codling moth cover spray was advised four and one-half weeks after petal fall. In 1929 it was five weeks after petal fall, but in 1930, this spray was recommended to be applied fifteen days after petal fall in the soutnern part of our State, but in Ottawa county, northern Ohio, due to cool temperatures and delayed emergence, this spray was not advised until 28 days after petal fall.

With such a variation in insect behavior, due to the influence temperature has upon it, the spray service aims to give the grower information about the seasonal conditions and advises him when to spray for best results. We can see from the three years' records that it would be absolute folly to set a standard date for applying these codling moth cover sprays.

The same procedure is followed in order to determine the time of applying the midsummer spray for the second brood of worms, with the exception that temperature at this time of year is nearly always favorable for egg laying. The spray service instructs the grower about the time of appearance of the second brood moths and advises him when to spray to be ahead of the new brood of hatching worms.

In addition to timing the sprays, the service is in a position to tell when it is necessary to incorporate extra sprays in order to deal with an increasing codling moth problem. At least one extra spray was advised for two counties in 1930, when the local observer found that the volume of the brood of insects was so great and the distribution of emergence so prolonged that the usual cover spray would not give control. Where moths are abundant and emergence prolonged, two first brood cover sprays are advised, while in other sections, where the

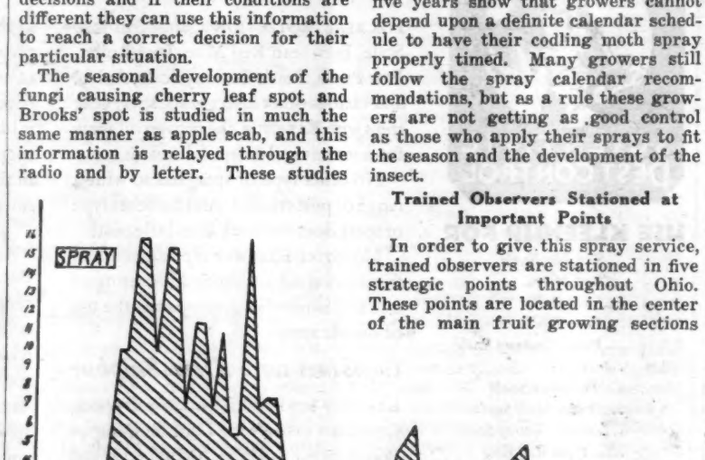

Figure III. Total emergence of apple maggot flies (Rhagoletis pomonella) in Lake and Geauga counties, 1930.

problem is less acute, the growers are advised not to apply this extra spray.

The information about codling moth is sent to the growers by radio and through letters mailed from the county agents' office. These letters are prepared at the university and the information they carry is made to apply to the section of the State to which they are sent.

Apple Maggot Sprays Also Timed

In the same manner as outlined for the codling moth, the sprays for apple maggot control are timed for northeastern Ohio. This insect emerged from obscurity into the limelight of destruction in northeastern counties during 1929. Here again a careful study of the insect proved its downfall. The extension service solved this problem by having emergence cages placed on the soil underneath apple trees, which had previously borne infested fruit. True to form, the adult apple maggot flies came out and were caught in these cages at the time of year when they began to appear on the trees. A spray of arsenate of lead was planned to serve as a poison drink for these flies as they rested on the leaves and before they laid their eggs in the fruit.

Figure III shows a composite of the distribution of emergence of these adult flies in the cages used. As a result of this information, an arsenate of lead spray was recommended to be applied between July 14 and 18, 1930. The second brood codling moth spray, which was recommended for August, coincided with a second apple maggot spray, and growers who followed these two sprays produced fruit free from apple maggot injury.

Growers Find Spray Service Valuable

In all of the spray service recommendations both insects and diseases are carefully considered and spray applications timed so that they afford maximum protection. As a rule six or seven well-timed sprays will produce a crop in which 90 per cent of the fruit is free from all insect and disease blemishes.

In order to check on the spray service recommendations, certain growers were asked to apply a tank load of the spray materials as recommended on the same trees each time the spray service recommended an application for their locality. These growers kept a record of the dates of applications, amounts and materials used and other useful information. The fruit on these trees was carefully checked in the fall by an extension representative and a record obtained on all insect and disease injuries. In 1928, 22 growers, located in 17 counties, kept such records. At harvest time, an average of 90.6 per cent perfect fruit was found in their orchards. In 1929, which will be remembered as a severe apple scab year, these spray test orchards produced 90.7 per cent clean fruit.

Those growers who were able to follow the spray service recommendations completely in 1930 and who were thorough in their application, obtained better than 92 per cent disease and insect free fruit. Since many of the blemishes found were of minor importance, more than 95 per cent of this fruit could be marketed as U. S. No. 1.

If you are interested in hearing the recommendations as they are given over the radio this year, the Ohio State University at Columbus, Ohio, will be glad to furnish inquirers with information about what stations and at what hours during the week this service will be given during 1931.

WALSH GARDEN TRACTOR

Lots of Power

AND POWER MOWER

A Complete Gas-engined Outfit for Gardeners, Florists, Nurseries, Suburbanites, Fruit Growers, Parks, Estates, Cemeteries, Poultrymen and Small Farmers.

EASY TO USE—EASY TO OWN

Does away with hand hoeing, weeding, and other back-breaking tasks. Does field work also Lawn-mowing & with Sickle Bar Mower cuts hay, weeds & long grass.

GUARANTEED TOOL CONTROL

With new Unit Tool Control even a novice easily does closest work.

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Use the Walsh either as a Walking or Riding Outfit

RUNS BELT MACHINERY

like Feed Mills, Pumps, Saws, Concrete Mixer, Washing Machine, or Grindstone.

SPECIAL FACTORY PRICE

Our Present Factory offer makes it easy to own a Walsh. Write Today!

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Seeds
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Mows Hay and Lawns

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Free Catalog

New Improved Models

The Ospraymo Way is the Right Way to Spray

Double the dollars at harvest with OSPRAYMO SPRAYERS

Avoid costly delays. Use Ospraymo, the sturdy sprayer that has automatic agitators, a pressure regulator and gauge. Brushes on revolving paddles keep suction strainers clean—prevent clogging and lost time.

They are built to stand hard bumps and jolts. H. P. Miller of Grantsville, Md., writes: "The Ospraymo potato sprayer I bought 10 years ago is still doing good work." John Smith, Westport, Mass., says: "Used your traction sprayer 29 years and still using it." J. Le Roy King of Tully, N. Y., says: "Union Leader has been going all spring and has performed wonderfully well."

They make two bushels grow where one grew before. As high as 600 bushels of potatoes per acre is possible if you Spray with our Ospraymo Leader.

We make a sprayer for every need, High Pressure guaranteed. Let us tell you the name of our nearest dealer. We have been world leaders for 48 years. Send for our free illustrated catalog.

FIELD FORCE PUMP COMPANY
Dept. B, ELMIRA, N. Y.

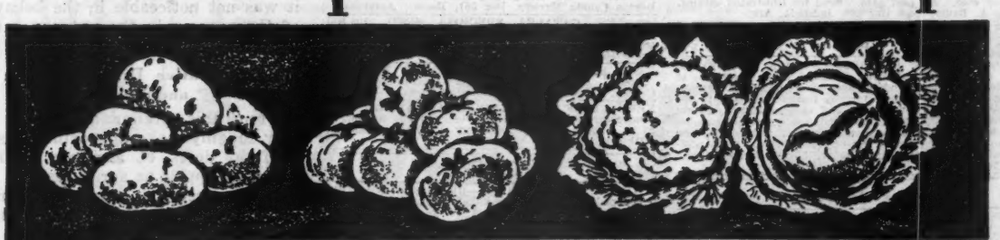
OSPRAYMO

THE SPRAYER THAT NEVER CLOGS

Plenty of

nitrogen

makes profitable crops



Nitrogen makes plants grow—produces the fancy vegetables that bring the fancy prices on the early market. Use plenty of it in your mixed fertilizer at planting time and side-dress with Arcadian Sulphate of Ammonia when the growing plants begin to feed heavily.

Mr. A. Morris Todd of Sparrows Point, Md., is only one of hundreds of truck growers who increased their yields with Arcadian. He side-dressed his spinach crop with Arcadian Sulphate of Ammonia. The result was a gain of 652 baskets per acre representing a net profit of $160 over and above the cost of the side-dressing.

Arcadian Sulphate of Ammonia contains a guaranteed 20.56% nitrogen content — all quickly available. It is easily applied and can be obtained in moisture-resistant bags of 100 lbs. for convenience; 200 lbs. for economy.

Order Arcadian Sulphate from your fertilizer dealer when you get your mixed goods.

The Barrett Company 40 Rector Street, New York, N. Y. Atlanta, Ga. Norfolk, Va. Memphis, Tenn. Cleveland, Ohio San Francisco, Calif. Montreal, Que., Canada

NITROGEN IS THE GROWTH ELEMENT

As essential as sunshine to growing crops. Be sure your crops get plenty of nitrogen both in the complete fertilizer you use at planting time and as top-dressing or side-dressing during the growing season.

ARCADIAN
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SULPHATE of AMMONIA

THE CURB MARKET

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IF YOU WANT A WONDERFUL OPPORTUNITY to make $15 profit a day and get a new Ford Sedan besides, send me your name immediately. No experience necessary. Particulars free. Albert Mills, 8903 Monmouth, Cincinnati, Ohio.

BIG MONEY DAILY SELLING SHIRTS, TIES, Underwear, Sox, Pajamas, Belts, Professional Uniforms, Raincoats, Coveralls, Pants, Children's Playsuits. Outfit FREE! Experience unnecessary. NIMROD CO., Dept. 102, 4922-28 Lincoln Ave., Chicago.

ALFALFA SEED

HARDY TYPE COMMON VARIETY—PER BUSHEL $6.50, $8.40, $10.20, $11.40. Grimm Variety Alfalfa Seed, $14.00, $16.80; $18.00; Unhulled White Sweet Clover Seed, $1.90; Hulled or Scarified, $3.00, $4.50, $5.40; Medium Red Clover, $11.40; Alsike Clover, $10.80. Bags Free. Write today for samples, 40 page catalogue. Lowest prices. All kinds farm and garden seeds. Kansas Seed Co., Salina, Kansas.

BEES

PACKAGE BEES WITH QUEENS, TWO POUNDS $2.75; Three pounds $3.50. Large orders discounted. Satisfaction guaranteed. CITRONELLE BEE COMPANY, Citronelle, Alabama.

PACAGE BEES WITH YOUNG ITALIAN Queens. Spring Delivery—F. O. B. 2 lbs.—$3.25; 3 lbs.—$3.75. Large orders discounted. Satisfaction Guaranteed. Overbey Apiaries, Leonville, La.

PURE ITALIAN BEES. GENTLE AND VIGOROUS: Shipped in 2 and 3 lb. Special packages for the fruit grower, with queens. Prices reasonable. Write Shaw & Ramsey, Lorenaville, La.

BEES FOR ORCHARDS. THE FRUIT GROWERS should use one strong colony of bees to each acre of orchard. Get our hard-time prices. The Mangham Apiaries Co., Mangham, La.

BEES FOR POLLINATION. READY FOR ORchard. Orders must be placed early. Write, Roy Weaver & Bro., Navasota, Texas.

FRUIT GROWERS—USE OUR LONG TONGUE Caucasian Bees for larger yields. They are gentle, prolific, hardy and fly at low temperature. Bolling Bee Co., Bolling, Ala.

PURE 3 BAND ITALIAN BEES—1-2 LB. PACKAGE with queen $3.50; 10 packages $2.90 each, 20 packages $2.50 each. 3 lb. 50 cents more. D. C. Jackson, Funston, Ga.

BERRY PLANTS

NEW BLAKEMORE STRAWBERRY—THE WONDER berry of them all, highly recommended by the Department of Agriculture. We have pure stock: 25, 85c; 50, $1.10; 100, $2.00. Mastodon Everbearing—The greatest everbearer out. 25, $1.00; 50, $1.75; 100, $3.00. Great Youngberry—This berry is a cross of Austin Dewberry and Loganberry; has flavor of Red Raspberry; wonderful fruit, makes big yields; clear $500.00 per acre. Dozen, $2.50; 25, $4.50; 50, $6.50; 100, $10.00. Best buy ever. All post paid. Send for illustrated catalog. J. A. Bauer, Lock Box 168, Judsonia, Ark.

BOOKS

PROHIBITION PUNCHES—A BOOK OF BEVERages. Governors' wives, Senators' wives, presidents of women's clubs, and various other prominent women, have contributed their favorite fruit drinks to this collection of thirst-quenching and *legal* cocktails. Drinks that are fizzy and drinks that are quiescent—smashes and frappes and floats and sherbets and frappes and just plain punches—a generous assortment. $1.50 postpaid. American Fruit Grower, 53 W. Jackson Blvd., Chicago.

DOGS

FOR SALE—20 CHOICE SELECT COONHOUNDS, cheap on trial. Kevil Kentucky Kennel, B212, Kevil, Ky.

FARMS AND ORCHARDS

PROFIT-MAKING FARMING POSSIBLE IN Southern Alabama and West Florida. Early Truck and Fruit Crops assured by good soils—ample rainfall, long growing season. Reasonably priced lands. Dairying, poultry raising profitable. Quick transportation to markets. Address C. B. Michelson, Colonization Department, Frisco Railroad, 365 Frisco Building, St. Louis, Mo.

FOR SALE—80 ACRE ORCHARD NEAR TOWN. 1500 choice varieties of APPLE trees in bearing. $500 down payment and terms. Might lease. T. W. Campbell, Dixon, Mo.

FARMS WANTED

WANTED—FARMS OR BUSINESS EVERYWHERE. Cash buyers. National Brokers, 2518 Lakewood, Detroit, Mich.

WANTED—TO HEAR FROM OWNER OF LAND for sale. O. Hawley, Baldwin, Wis.

WANTED TO HEAR FROM OWNER HAVING FARM or unimproved land for sale. Give cash price. John Black, Chippewa Falls, Wis.

INSTRUCTION

WANTED, MEN—WOMEN, 18—50, QUALIFY FOR steady Government Positions; $105—$250 Month; Common education; No Gov't experience required; Vacations with pay; Thousands appointed yearly. Write, Instruction Bureau, 259, St. Louis, Mo., quickly.

RAILWAY POSTAL CLERKS. $158.00—$225.00 month. Steady. Spring examinations likely. Common education. Men 18—35. Sample coaching free. Write immediately. Franklin Institute, Dept. A62, Rochester, N. Y.

MISCELLANEOUS

OLD MONEY WANTED—DO YOU KNOW THAT Coin Collectors pay up to $100.00 for certain U. S. Cents? And high premiums for all rare coins? We buy all kinds. Send 4c for Large Coin Folder. May mean much profit to you. Numismatic Co., Dept. 546, Ft. Worth, Tex.

CASH FOR GOLD TEETH. HIGHEST PRICES. Information free. Southwest Gold & Silver Co., Box 68V, Fort Worth, Texas.

RAISE RABBITS. PIGEONS. GUINEA PIGS. Good market. Stock Supplied. Catalogue 10c. Houck's, Box L, Tiffin, Ohio.

NURSERY STOCK

100 MASTODON EVERBEARING $1.50. CATALOG Free. 100 Varieties. Oak Hill Nursery, New Buffalo, Michigan.

16 MOST PROFITABLE VARIETIES STRAWBERRY plants $3.00, 1000 up, Latham largest red Raspberries, 100 Cumberland black Raspberries $2.25, 1000 $15.00 Blackberries, Grapes, etc. Highest Quality guaranteed. Catalog free. Westhauser Nurseries, Sawyer, Michigan. (R).

PEACH TREES $4.00. APPLE, $6.00, PER 100. Price list free. Egyptian Nurseries, Farina, Ill.

STRAWBERRY PLANTS. COMMERCIAL GROWers needs promptly supplied. High grade plants. Excellent root system. Sandy soil. Thirty standard varieties. Write for price list. Howard Strawberry Fields, Brodhead, Wisconsin.

PEACH AND APPLE TREES 5c AND UP. YELLOW and Blood Red Delicious. Grapevines 3c. Plums, pears, cherries, nuts, berries, pecans, ornamentals. FREE catalog. Tennessee Nursery Company, Box 101, Cleveland, Tenn.

WE SELL ON THE CREDIT PLAN. BEST VArieties. Apple, Peach Trees low as 5c. Grapevines, 3c. Shrubs 10c. Evergreens, 25c. Seeds, Bulbs, etc. Benton County Nursery, Box 501, Rogers, Arkansas.

500 LBS. CATALPA SPECIOSA SEED, 100,000 Dunlap and Aroma strawberry plants; also grafts, seedlings, and cuttings. Full line nursery stock. Schroeder Nursery, Farina, Ill.

REAL BARGAINS IN FIRST CLASS NURSERY Stock, Prepaid. Satisfaction Guaranteed. Free Catalog. Ozark Nursery, Rogers, Arkansas.

NEW "CHIEF" RED RASPBERRY, AND BLAKEmore strawberry. 1000 strawberry plants as low as $3.25. South Michigan Nursery (R2) New Buffalo, Michigan.

POULTRY

WHITE LEGHORN CHICKS—BIG DISCOUNT NOW. Shipped C. O. D. anywhere. Guaranteed to live and outlay others. Egg-bred 30 years—laying contest records to 334 eggs. Thousands of satisfied customers. Laying hens, 8 week-old pullets. Bargain prices. Write for free catalog and price list. George B. Ferris, 922 Union, Grand Rapids, Mich.

BABY CHICKS, 20 VARIETIES, 7c UP. WORLD'S Record 351 egg ROP. breeding. Free catalog. 10 chicks FREE on early orders. Beckmann Hatchery, Box 57Q. Grand Rapids, Michigan.

TURKEYS

BEST QUALITY MAMMOTH BRONZE BABY TURkeys only 60c each. 500 or more 55c. 100% live arrival guaranteed. My turkeys are large and have wonderful plumage and vitality. You will be satisfied. Order now for spring delivery. 25% will book your order, balance C. O. D. Robert R. Getman, Hancock, Wisconsin.

NEW LIGHT ON THE SPRAY RESIDUE PROBLEM [From Page 5]

Gains in Weight

To make comparisons in gain of weight of the various lots, the weights of males and females were separated. Gains made by males were greater than those made by females. Neither the kind of insecticide nor the amount of insecticide seemed to affect the growth as measured by gain in weight. A rat receiving 24 times the international tolerance (.2328 mg. per kilogram) made the greatest gain of any rat that received lead arsenate for eight weeks. Moreover, the rats receiving lead arsenate made greater gains on an average than did rats receiving none. On an average the rats gained very similarly to the control rats receiving no lead arsenate.

No symptoms of poisoning were noticed at any time in any of the rats of series I and II. In fact, normal activity and health were exhibited at all times by all the rats receiving the insecticides. An autopsy also showed no injurious effects whatever.

Results Obtained

For series III, however, an autopsy on each of the five rats receiving from 1.857 to 22.284 mg. of arsenous oxid showed a lack of internal fat compared to normal rats. The heart, kidneys, liver, and intestines did not show any abnormal conditions, except in the case of one rat which received 2.775 mg. In this instance a slight degeneration of the kidneys had occurred, not necessarily due to the arsenic.

The Lethal Dose

Three rats were used in this test. They received from 44.568 to 487.5 mg. of arsenous oxid per twenty-four hours. One rat was given 44.568 mg. the first twenty-four hours. The second twenty-four hours this rat received two doses of 44.568 mg. eight hours apart, or a total of 89.136 mg.; and the third twenty-four hours, three doses of 44.568 mg. were given at four-hour intervals or a total of 133.704 mg. This last amount was continued daily until the rat died on the eighth day. This particular rat received a total of 867.02 mg. of arsenous oxid per kilogram of weight in the eight days before death occurred. A second rat was given 185.713 mg. per kilogram weight in a single dose at twenty-four hour periods until death occurred. The rat in this test died at the end of sixty hours, and had received a total of 557.1 mg. of arsenous oxid.

A single dose of 487.5 mg. was given another rat, which died after thirty hours. From these tests, therefore, a lethal dose for a full-grown albino rat seems to be near 500 mg. of arsenous oxid, which is equal to 7.5 grains of arsenic per pound of fruit.

Less arsenous oxid is required to kill in a single dose than when administered in several doses over a period of time. This may in part be due to excretion, since chemical analyses of the urine and faeces show that elimination of arsenic occurs by these channels.

If there were any cumulative injurious effects of the arsenic for the period of feeding in series II and III, it was not noticeable in the behavior of the rats or in the autopsy examinations.

Comparative Doses for Man and The Rat

From this preliminary work, we may roughly make approximations as to fatal doses of arsenate of lead found on apples as spray residue. In this, of course, it is assumed that man and the rat are affected in a similar manner.

Assuming that a pound of fruit contains two times the international tolerance of 0.01 grain (.65 mg.) arsenous oxid per pound of fruit, a rat weighing 200 grams would be required to consume at one time .29 pound of fruit to cause any deleterious effects. Making a similar calculation, man would be required to consume at one time 100 pounds of fruit to cause harmful effects.

The above calculations are made on the basis of the lowest quantity of arsenous oxid required to cause deleterious effects to the rat. It should also be added that in these investigations the deleterious effects were taken as 1.857 mg. per kilogram weight.

According to O'Kane, Hadley, and Osgood, the minimum fatal dose for man is about 130 mg. This is much lower than would seem to be the fatal dose according to the investigations made with rats in these experiments. Moreover, these authors state that the solubility of arsenous oxid is much less as lead arsenate than as white arsenic. It is also true that the solubility of white arsenic is variable. The solubility of the arsenous oxid in the lead arsenate used in this investigation may be different from that used by the New Hampshire workers.

Index to Advertisements

The concerns whose advertisements appear listed below are equipped to give prompt and satisfactory service to the American fruit grower. Most of them issue literature that is freely at the disposal of our subscribers. It is to the advantage of all that when writing to an advertiser you use the address exactly as it appears in the advertisement, and that you state in your letter: "I read Your Advertisement in AMERICAN FRUIT GROWER MAGAZINE."

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STATIONS SOLVE GROWERS' PROBLEMS

(From Page 29)

graph were supposed to have merit in this respect and were studied carefully with that point in mind. Several modifications of our older standard sorts of materials have been suggested and an effort is being made to determine their value.

The seriousness of foliage injury is frequently not realized and is often blamed to other factors. On the other hand, spraying materials are sometimes given credit for troubles that are caused by disease, insects, or unfavorable environment. Spray injury often follows injuries of other sorts. Studies of spray injury are complicated by the fact that the results obtained one year may be entirely reversed the next season. In fact, several years' work is necessary before it is safe to make an unqualified recommendation about a new procedure, except in case of materials that show at once that they are unsafe.

The work with spray injury has included a comparison with standard materials of many of the new materials. Among these have been dry lime-sulphur, wettable sulphurs, Sulfocide, colloidal sulphurs, and several copper compounds. In addition to this, several modifications of the lime-sulphur-lead-arsenate spray have been tested. In this group of materials comes the use of lime, casein spreader, gypsum, ground tobacco and other miscellaneous materials. Modification with aluminum sulphate has been tested to some extent.

The use of iron sulphate with the standard lime-sulphur-lead-arsenate mixture has been tested on apples for several years and with very satifactory results in most respects. More recently, work has been begun with this combination on other fruits.

"APPLES FOR HEALTH" PLAN FAILS

The plan of the "Apples for Health" organization to raise an advertising fund by a general levy of one cent per bushel on the apple crop has failed by reason of lack of support.

The plan was laid in the summer of 1926 and submitted to the various fruit organizations the following winter and every year since.

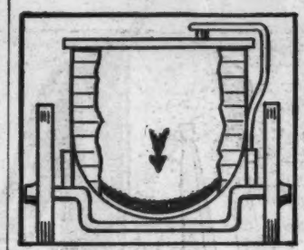
Last year a prominent Chicago advertising agency was induced to invest $10,000, it is stated, to promote a plan whereby the container manufacturers were to collect the funds by the addition of a charge of one cent per bushel container or three cents per barrel, turning the funds so collected over to the agency for use in advertising the apple.

Assurances were given to the agency by leaders in the horticultural societies that the proposed plan had the backing of the apple industry and that the leading spirits in the Apples for Health organization possessed the confidence of the growers.

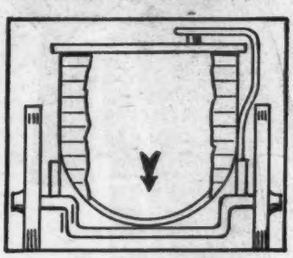
After a vigorous campaign it was found impossible to secure the signed agreements of more than a handful of growers to the cent-a-bushel levy, and among these were only a few of the officers of the organization.

The money contributed by sprayer, insecticide and equipment and supply manufacturers has been returned.

How Much do you Pay for Lead Settlings?



Ordinary Lead Settles to Bottom



Nu REXFORM Remains in Suspension No Settlings

A letter from O. C. Duke says: "We have just ordered our NuREXFORM Arsenate of Lead for the coming year. We have used NuREXFORM on our three school class orchards and fifty-seven other orchards, and would not use anything else for insect control. The reason we use it is for its superior sticking qualities through drenching rains; and because it stays in solution so well. Before using NuREXFORM we had much trouble in sediments in the bottoms of our spray tanks. Every year we are offered leads several cents per pound less than NuREXFORM, but we can't afford to use them."

NuREXFORM Economical

Growers who analyze costs will invariably chose NuREXFORM. There are three distinct spraying problems that are eliminated when NuREXFORM is used.

1st. Every ounce of NuREXFORM stays in supension and reaches the tree in uniform strength. None settles to the bottom of the tank to be later scraped out as useless waste.

2nd. NuREXFORM does not clog screens and nozzles. Thus loss of time in cleaning clogged screens and nozzles is eliminated when NuREXFORM is used.

3rd. NuREXFORM gives a uniform coverage and protection to foliage and fruit. It does not bunch up leaving heavy residue over some portions of the foliage and fruit while other portions are unprotected.

Mixes With Lime Sulphur

Hundreds of prominent growers testify to many advantages of NuREXFORM. Outstanding, is the ability of NuREXFORM to mix with Lime Sulphur for a combination spray. The particles remain finely divided and do not bunch up, thus giving uniform coverage.

Give NuREXFORM a complete and thorough trial in your orchards. You can depend on REX and you will not be disappointed.

Other REX Products include:
REX Lime and Sulphur Solution.
REX Dry Lime Sulphur.
REX Oil Emulsion.
REX Bordo Mixture.
REX 85-15 Sulphur-Lead Mixture.
REX 85-15 Sulphur-Lead Dust Mixture.
REX Sul-Powder.
REX Copper Dusts.
REX Calcium Arsenate.
40% Nicotine Sulphate.
Sulphur.

The Toledo Rex Spray Co. . . . . Toledo, Ohio
The Rex Co. . . . . North Kansas City, Mo.
Canada Rex Spray Co., Ltd. . . . . Brighton, Ont.
California Rex Spray Co. . . . . Benicia, Calif.
Payette Valley Rex Spray Co., Ltd. . . Payette, Idaho

NuREXFORM
IMPROVED AND PATENTED DRY ARSENATE OF LEAD

Let BEES Increase Your Income

GLEANING IN BEE CULTURE: An illustrated monthly magazine for those interested in bees and beekeeping, and well established as an authoritative journal. Departments: "Talks to Beginners" and Questions and Answers are of especial value to the inexperienced man who desires to get the right start.

BEES AND FRUIT: A concise presentation of beekeeping as an aid to orchard profits. Some of the subjects covered are: Honeybees for the Orchard, Renting Bees, Buying Bees, Package Bees, Purchase of Colonies, Cost of Equipment, Problems of the Fruit Grower-Beekeeper, The Fruit Grower's Apiary, Bees and Fruit, etc., etc.

EXPERIENCE has shown that colonies of bees properly distributed through the orchard at the right time will increase the "set" of fruit. Doubled, and even trebled, yields are not uncommon, *and this slight extra work is in itself a source of profit!*

INFORM Yourself about Extra Profit Possibilities

To assist our fruit growing readers in getting dependable information about the possibilities in beekeeping, the necessary steps and the cost to start with bees, we have arranged to make the offer contained in the square to the right.

"Bees and Fruit" treats this important subject from the standpoint of the man whose chief concern is the size and quality of his fruit crop, rather than from the view of the commercial honey-producer. Yet it discloses sources of profit from the beekeeping investment itself.

You can renew or extend your subscription to "THE FRUIT GROWER" for one year, and receive "GLEANINGS" likewise for a year, together with the booklet.

The subject is important to every fruit grower, the information offered is entirely dependable, and the cost is slight—one dollar. Your name and address on the lines below should be sent today to

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(If you are now a subscriber to AMERICAN FRUIT GROWER and you wish your subscription extended or renewed, please check here (.....)

FASHIONS

3172—A brown canton crepe jacket suit that is exceedingly modish with yellow tuck-in blouse. The skirt is quite unique with circular inset at the left side, with plaits stitched to depth well below the hip at the right side. Sizes 16, 18 years, 36, 38, 40 and 42 inches bust. The 36-inch size requires 4⅝ yards of 39-inch material for jacket and skirt with 3 yards of 39-inch material for blouse and jacket lining.

2650—A dashing sports frock of navy blue flat crepe silk with white crepe collar and cuffs. The tightened hipline gives emphasis to the basque effect of the bodice. Sizes 14, 16, 18, 20 years, 36, 38, 40 and 42 inches bust. The 36-inch size requires 5⅛ yards of 39-inch material with ¾ yard of 39-inch contrasting and 3½ yards of binding.

2652—A sports jacket with charming femininity added by capelet collar. It lends itself to sheer velvet, crepe silk, crepe marocain, crepy woolens and featherweight tweed. Sizes 14, 16, 18, 20 years, 36, 38, 40, 42 and 44 inches bust. The 36-inch size requires 3¼ yards of 39-inch material with 2 yards of 39-inch lining. Frock No. 2645 comes in sizes 14, 16, 18, 20 years, 36, 38, 40 and 42 inches bust.

3070—A swagger sports interpretation in feather weight tweed. It's one-piece! A box-plaited flounce lengthens the front to flare the hem. Sizes 14, 16, 18 years, 36, 38 and 40 inches bust. The 16-year size requires 2⅞ yards of 39-inch material with ⅜ yard of 39-inch contrasting, 3½ yards of binding and ¼ yard of 27-inch material for belt.

Dress Patterns may be secured by mail, postage prepaid, at 15 cents each from AMERICAN FRUIT GROWER PATTERN SERVICE, 53 W. Jackson Blvd., Chicago, Ill. Be sure to state size required. Enclose 10 cents additional for copy of Fashion Magazine (15 cents where no pattern is ordered).